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Environmental Impact Statement



Prairie Potholes EIS

Vegetation Allocation

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March 23, 1981

Dear Reader:

The Prairie Potholes Vegetation Allocation Draft Environmental Impact Statement is presented for your review and comment. The document describes vegetation allocations and recommended grazing management programs for approximately 1.7 million acres of public lands administered by the Bureau of Land Management in the Havre, Phillips, and Valley Resource Areas of the Lewistown District. A preferred alternative and five other alternatives are presented for consideration. The six possible alternatives are described briefly in the abstract in the front of the document and more completely in Chapter 2. The environmental consequences of each alternative are considered in Chapter 4.

Written comments from interested citizens and public agencies will be accepted until May 22, 1981. Comments should be sent to Glenn W. Freeman, District Manager, District Office, BLM, Airport Road, Lewistown, Montana 59457; telephone number 406-538-7461, extension 239.

After the comments received have been reviewed, a final environmental impact statement will be prepared. Unless the changes are extensive, the final statement may consist of only the comments, responses to the comments and errata sheets to update information contained in the draft document; therefore, interested parties should retain their copies of the draft EIS.

Hearings for public comment have been scheduled as follows:

Glasgow, Montana — April 22, 7:30 p.m. at the Valley County Courthouse

Chinook, Montana — April 23, 7:30 p.m. at the Blaine County Library

Malta, Montana — April 24, 7:30 p.m. at the Phillips County Courthouse

Helena, Montana — April 27, 7:30 p.m. at the Colonial Inn, Lewis Room 2301, Colonial Drive

Testimony received through written comments or at the public hearings will be considered during preparation of the final environmental impact statement. No decision on the preferred vegetation allocation and grazing management program will be made until the final environmental impact statement is completed.

Sincerely yours,

Michael J. Penfold

Michael J. Penfold
State Director

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VEGETATION ALLOCATION IN THE PRAIRIE POTHOLES AREA OF MONTANA

DRAFT

Prepared By

BUREAU OF LAND MANAGEMENT
DEPARTMENT OF THE INTERIOR

Michael J. Penfold

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

PRAIRIE POTHOLES VEGETATION ALLOCATION
DRAFT ENVIRONMENTAL IMPACT STATEMENT

PART OF GLACIER COUNTY AND BLAINE, CHOUTEAU, DANIELS, HILL, LIBERTY PHILLIPS, ROOSEVELT, SHERIDAN, VALLEY AND TOOLE COUNTIES IN MONTANA

This *Draft Environmental Impact Statement* (DEIS) discusses proposed vegetation allocations for about one and three quarters million acres of public lands administered by the Bureau of Land Management in the Lewistown District. Six alternative courses of action, including a preferred alternative, have been analyzed. Final vegetation allocations and course of management action will be decided from these six alternatives. The environmental consequences of each alternative have been analyzed for both the period of implementation, between 1981 and 1988, and for the long term, the 22 years following implementation.

Alternative A, "Enhanced Combined Vegetation Uses," would seek a balanced level of vegetation allocation among domestic livestock, wildlife and non-consumptive uses. Management activities involving grazing and land treatments would be relatively intense. A substantially increased allocation would be made to all three uses over the long term because of the significant improvement in ecological range condition. Wildlife habitat, particularly in riparian zones, would improve. Ranch income would increase moderately as more vegetation became available to livestock. Alternative B is BLM's Preferred Alternative. "Continuation of Present Management" also has a balanced vegetation allocation as its objective but would entail less intensive management activities than Alternative A. It would include fewer grazing and land treatments as well as fewer range developments. Livestock, wildlife and non-consumptive uses would still receive greater vegetation allocations over the long term due to a moderate improvement in ecological range condition. Ranch income would also increase under this alternative but not as substantially or rapidly as under Alternative A. Alternative C, "Enhanced Livestock Forage," would result in a higher initial vegetation allocation to livestock and a highly significant increase over the 22 year long term. Wildlife would also receive a substantial increase in vegetation but some important wildlife areas, particularly riparian zones, would have less improvement than under Alternatives A, B or D. Ranch income would significantly increase. Alternative D is "Enhanced Watershed Values and Wildlife Habitat" and would significantly increase vegetation allocations to both non-consumptive uses and wildlife. A 30 percent decrease in vegetation currently used by livetock would occur initially and a net 17 percent decrease would result in the long term. Ranch income would decrease. Watershed condition and wildlife habitat would improve significantly. "No Grazing," Alternative E, would eliminate domestic livestock grazing on public lands in the EIS area. Ranch income would be seriously reduced. While some improvement in wildlife habitat and watershed would occur, it would not be as substantial as under Alternatives A, B, C or D. Alternative F, "No Action," would freeze the present management level. Wildlife habitat and watershed condition would remain static in most areas but would decline slightly along with ranch income in part of the area covered in the EIS.

Of the alternatives, only Alternatives C and E would have a perceptible impact on the region's economy.

Components of the six alternatives are presented for public review in this DEIS. The document is the text and map supplement. The location of the DEIS study area within the state is shown on Map 1.1 in Chapter 1.

For further information, contact Glenn W. Freeman, District Manager, Lewistown District Office, Bureau of Land Management, Drawer 1160, Lewistown, Montana 59457 or phone (406) 538-7461.

MARCH 1981

SUMMARY

The Prairie Potholes Draft Environmental Impact Statement (DEIS) includes the Bureau of Land Management's (BLM) three northern divisions of the Lewistown District: the Havre, Phillips and Valley Resource Areas. The total area of the Prairie Potholes is around 15.5 million acres, encompassing all or parts of 11 northem Montana counties. This area contains about 1.75 million acres of public lands administered by the BLM.

Soil and vegetation inventories, water resource surveys, social and economic surveys and other resource inventories were begun in 1977 and completed in 1980. Throughout the resource inventory and survey process, the public was asked to suggest issues and concems on the use of public lands.

Public participation in BLM's planning process was solicited through individual interviews in the EIS area, newspaper articles, radio announcements and the mailing of more than 1,700 brochures to livestock operators using public lands, residents and interested groups in the area. More than 200 comments were received as a result of this brochure. In addition, open house sessions were held in Havre, Malta and Glasgow, May 19-21, 1980, to solicit responses from the public. A list of agencies and organizations consulted or commenting on public land issues can be found in Chapter 5.

Based on resource inventories, issues raised by the public and procedural requirements, six alternative courses of action were developed. Alternative B, "Continuation of Present Management," was selected as the preferred alternative because of the resource benefits, cost and public comment. After reviewing the Draft EIS, decisionmakers will select the final grazing management plan to be implemented on public lands in the Prairie Potholes EIS area. This management plan may be the preferred alternative or it may incorporate parts of all alternatives.

Major concems raised by the public fall into three broad categories: livestock production, wildlife habitat maintenance and watershed protection. Concerning ranching, local residents felt that the ranching industry should be protected and livestock use levels maintained through the development of grazing treatments, maintaining the quality and quantity of forage, controlling undesirable plant species, reseeding rangeland, controlling prairie dogs and making more water available for livestock. Wildlife concerns of the public included balancing wildlife and livestock use and maintaining and improving wildlife habitat. Other public concems centered on the protection of watersheds and soil resources. Many people felt that things should be left as they are because longtime resource conservation practices in effect over the years has maintained or improved resource conditions overall on both private and public lands. BLM resource specialists raised issues almost parallel to those of the public. Major concerns brought forth both by the public and by BLM specialists are considered in this DEIS.

Two of the major livestock issues are the need to improve ecological range condition and increase forage for livestock. Of the 1,749,238 acres of public lands in the EIS area, approximately 6,803 acres are in poor ecological range condition, 623,022 acres are in fair condition, 1,035,208 acres are in good condition, 14,832 acres are in excellent ecological range condition and 69,373 acres are unclassified as to condition.

In this DEIS the six alternatives from which the final grazing management program will be selected are titled: (A) Enhanced Combined Vegetation Uses, (B) Continuation of Present Management (the Preferred Alternative), (C) Enhanced Livestock Forage, (D) Enhanced Watershed Value and Wildlife Habitat, (E) No Grazing and (F) No Action.

Proposals in Alternatives A, B, C and D would reduce the amount of range in poor and fair ecological range condition. Alternatives A, B and C increase the forage allocation to livestock ranging anywhere from 15-98 percent.

Initial livestock animal unit months (AUMs) would remain the same in Alternatives A, B and F, increase by 17 percent in Alternative C, decrease by 30 percent in Alternative D and decrease to zero in the first 7 years after implementation (the short term) in Alternative E. In the long term (22 years after implementation), Alternatives D and E would result in fewer livestock AUMs, Alternative F would not change livestock AUMs and Alternatives A, B and C would increase the livestock AUMs. The Preferred Alternative would increase livestock forage by 15 percent because of the implementation of mechanical and grazing treatments and the development of range facilities.

Another major issue is the protection and improvement of riparian vegetation along streams and around reservoirs. Riparian surveys show that 69 percent of the riparian habitat along 186 miles of stream is presently in unsatisfactory condition for wildlife habitat,adversely influencing water quality, stream channel stability and the production of riparian vegetation cover. Manage-

ment decisions to improve this habitat would restrict livestock grazing in specific riparian zones.

Both the public and BLM are concerned with maintaining adequate wildlife habitat while maintaining a balance between livestock and wildlife use.

Protecting soil by reducing erosion is another major concern of both the public and BLM resource specialists. Increasing vegetation cover through mechanical or grazing treatments would improve the capacity of the soil to absorb the water necessary for vegetation production. Increased absorption of moisture into the soil reduces runoff, erosion and maintains soil productivity. High levels of vegetation production would increase the amount of forage for both livestock and wildlife use. Other watershed concerns include limiting early season livestock use of wet soils in riparian zones to reduce soil compaction.

Commitments of manpower, materials, fuels and money expended during implementation of Alternatives A-E would be irretrievable and irreversible. Irretrievable losses would occur in these alternatives:

> Alternatives E and F would result in an irretrievable loss in vegetation production from the potential expansion of prairie dogs.
>
> Alternatives D and E would result in an irretrievable loss in permitted AUMs to livestock.
>
> Alternative C would cause an irretrievable loss in prairie dogs and sport shooting of them.
>
> Alternatives C, D and E might result in an irretrievable loss of several ranches because of income losses with an attendant loss in regional earnings.

Alternatives A-D might cause an irretrievable and irreversible loss to cultural resources if cultural sites were accidently destroyed.

A summary of the environmental consequences for each of the six alternatives follows.

ALTERNATIVE A: ENHANCED COMBINED VEGETATION USES

This alternative includes revision while continuing operation of the present 93 present allotment management plans on 558,986 acres of public lands, implementation of 419 new AMPs on 1,062,754 acres, continued permitted grazing use on 392 non-AMP allotments on 121,253 acres and unallocated status on 6,245 acres.

Watershed condition would improve significantly with reductions in sediment yield of 58 percent, water yield of 51 percent and improved water quality in streams and reservoirs. Water consumption by livestock would increase by 869 acre-feet/year.

The acreage of good and excellent condition range would increase 35 percent by the year 2003 while the acreage in poor and fair range condition would decrease by 58 percent. The ecological range condition of vegetation in streamside and reservoir riparian zones and saline seeps would improve on 1,324 acres while remaining static on 5,287.

The vegetation allocations to livestock and wildlife would increase by 19 percent and 25 percent, respectively, by the year 2003. Production of red meat would increase by 5,505,885 pounds annually based on AUM increases.

Wildlife habitat for big game, upland game birds, waterfowl and nongame species (except prairie dogs) would improve. The number of prairie dog towns would remain the same but the total acreage would be reduced by 64 percent. Deer and antelope populations are projected to double.

Reservoir fisheries would increase by 12. Improved shoreline vegetation around reservoirs would increase by 243 miles. The streambank condition in high value riparian zones would improve to satisfactory on a total of 91 miles of stream, increasing by 800 acres the total in satisfactory habitat condition. Ninety-five miles (2,303 acres) would remain in unsatisfactory wildlife habitat condition. Riparian vegetation around saline seeps would increase by 575 acres.

Recreation opportunities on public lands would be improved significantly by greater populations of big game and waterfowl and an increase of 12 fishing reservoirs. Off-road vehicle (ORV) access or use would be hindered by the construction of 650 miles of fences and 281,000 acres of mechanical treatments. Opportunities for the sport shooting of prairie dogs would decrease significantly in the long term. Impacts to wilderness and visual resources would be insignificant.

Range developments would be designed or located as necessary to avoid disturbances of cultural sites.

This alternative would result in a total income increase of $495,000 on 395 ranches. The value of grazing permits would increase by $7,804,000 annually and 32 new ranch related employment opportunities would be created. The social well-being of 527 ranch families would be improved.

In the long term regional earnings would increase $2,087,000 annually and provide employment for 186 people. Personal property tax would increase by $54,000 annually.

The total implementation costs for range developments including designing, surveying and building would be $14,356,300.

ALTERNATIVE B: CONTINUATION OF PRESENT MANAGEMENT (THE PREFERRED ALTERNATIVE)

This alternative includes revision while continuing operation of the 94 percent AMPs on 558,986 acres of public lands, implementation of 10 new AMPs per year during a 7 year period on 455,009 acres, continued permitted livestock grazing on 741 non-AMP allotments covering 728,998 acres and unallotted status on 6,245 acres of public lands. This alternative presents a lower level management program in comparison to the alternative developed from public comment and benefits-cost analysis.

Watershed condition would improve with a reduction in sediment yield of 26 percent and water yield of 22 percent. Water quality would improve with less erosion and runoff. Consumptive water use by livestock would increase minimally by 528 acre-feet/year.

By 2003 the acreage of good and excellent ecological range condition would increase by 26 percent and acreage in poor and fair range condition would decrease by 43 percent. Riparian wildlife habitat along streams and around reservoirs would improve or remain in static condition on 3,000 acres with downward or static trend on 3,611 acres. Vegetation allocated to livestock and wildlife (in AUMs) would increase by 15 percent. Production of red meat would increase by 3,344,670 pounds annually based on livestock AUM increases.

Wildlife habitat for big game, upland game birds, waterfowl and nongame species (except prairie dogs) would improve moderately because of land and grazing treatments on public lands. The number of prairie dog towns would remain the same but the total acreage would be reduced 64 percent. Reservoir fisheries would decrease by 1 even with the fencing of 7 reservoirs (36 acres) and improvement of 1,750 miles of shoreline vegetation. Habitat condition on streambanks would improve to satisfactory along 16 miles of streams, improving wildlife habitat on 388 acres. Riparian habitat in saline seeps below reservoirs would improve on 370 acres through rest treatments.

Recreational opportunities on public lands would increase in response to greater populations of game animals and waterfowl. A moderately significant increase in fishing quality would occur from the elimination of direct livestock use on 25 percent of the reservoir fisheries. Access and ORV travel would be hindered by construction of 300 miles of fences and the surface disturbances of 175,000 acres of mechanical treatments. Sport shooting of prairie dogs would increase in the short term but would be limited to the control of present populations on 615 acres in the long term. Effects on wilderness and visual resources would be insignificant.

Range improvement practices would be located to avoid cultural sites.

Implementation of this alternative would result in an increase of $296,000 in annual total income on 179 ranch operations. The value of grazing permits would increase by $4,635,000 and 22 new ranch related employment opportunities would be created. The social well-being of 239 ranch families would be improved.

Regional earnings would increase by $999,000 annually and employment would increase by 91 persons. Personal property taxes would increase by $27,000 annually.

The total implementation cost of this alternative would be $8,401,500.

ALTERNATIVE C: ENHANCED LIVESTOCK FORAGE

This alternative proposes continued operation while revising 93 present AMPs on 558,986 acres of public lands, implementation of 419 new AMPs on 1,062,754 acres, continued operation of 392 non-AMPs and unallotted status on 6,245 acres of public lands. The intent of Alternative C is to increase vegetation production for livestock at a proper use level (50 percent) for sustained vegetation production and improvement of forage.

Watershed conditions would improve substantially with reductions in sediment yield of 68 percent and water yield of 51 percent. Water quality would improve because of the substantial reductions in sediment and water yields. Water consumption by livestock would increase by 2,697 acre-feet/year.

The acreage of range in good and excellent ecological range condition would increase by 44 percent and range in poor and fair range condition would decrease by 73 percent. The ecological range condition of riparian, shoreline and saline seep vegetation would remain static or improve slightly on 6,611 acres. Vegetation allocations to livestock would increase by 17 percent in the short term, 94 percent in the long term. Production of red meat would increase by 3,849,930 pounds annually in the short term and 20,940,465 pounds in the long term.

Wildlife habitat for big game, upland game birds, waterfowl and nongame wildlife species would improve moderately, primarily because of vegetation production increases on the 920,000 acres of mechanical treatments. Deer and antelope populations are projected to increase 50 percent in the long term. Fisheries reservoirs would increase from 27 to 32 but would decline in quality and have reduced lifespans since they wouldn't be fenced. This would also be true of shoreline habitat which would increase by 243 miles due to construction of new water sources. Prairie dogs on 1,715

acres would be eliminated. Streambank habitat on high value riparian zones would improve to satisfactory condition on 5 miles of stream (121 acres) but 123 miles (2,982 acres) would remain in unsatisfactory wildlife habitat condition.

No significant increase in hunting or fishing quality would occur because of more conflicts with livestock. This would overshadow the gains in wildlife populations. ORV access or use would be hindered by the mechanical treatments on 920,000 acres (53 percent of the public lands) and construction of 650 miles of fences. There would be no sport shooting of prairie dogs since they would be eliminated in this alternative. No significant impacts to wilderness would occur. Surface disturbances by mechanical treatments might impair visual resources.

Range improvements would be located to avoid disturbing cultural sites.

In the long term ranch income would increase on 379 operations and decrease on 17 operations, resulting in a net increase of $1,936,000 annually. Permit values and ranch employment would increase by $30,831,000 and 127 positions, respectively. Social well-being would improve for 505 ranch families, a highly significant factor because of the large increases in income.

Regional economic impacts would be a short term increase of $3,696,000 in earnings annually, increased employment for 317 people and a $35,000 annual increase in personal property taxes. Long term increases would be $6,886,000 in annual earnings, 654 new jobs and $211,000 annually in property taxes. These increases would be considered as moderately significant overall.

The total implementation cost of range developments in this alternative would be $31,655,800.

ALTERNATIVE D: ENHANCED WATERSHED VALUE AND WILDLIFE HABITAT

This alternative includes revision while continuing operation of 93 present AMPs on 558,986 acres of public lands, implementation of 419 new AMPs on 1,062,754 acres, permitted livestock use on 121,253 acres in non-AMP status and unallocated status on 6,245 acres. This alternative would improve the soil, water and wildlife resources while maintaining light livestock grazing use.

Watershed condition would improve significantly with reductions in sediment and water yields because of increased plant production, litter cover and water infiltration. Sediment yield would be reduced by 58 percent, water yield by 50 percent. Water quality would improve significantly. Consumptive use of water by livestock would decrease by 485 acre-feet/year.

The acreage of excellent and good condition range would increase by 35 percent and range in fair and poor ecological range condition would decrease by 58 percent. Riparian and saline seep vegetation would improve significantly on 6,611 acres because of a 4-10 year rest treatment. Additional improvements in riparian zones would be expected as a result of light grazing use, spring deferment and rest treatments in AMP allotments.

Forage allocations to livestock would decrease by 95,132 AUMs initially, increasing in the long term to 274,983 AUMs (or 44,082 AUMs less than the present allocation of 319,065). Livestock allocations would decrease by 14 percent in the long term while wildlife and non-consumptive uses would receive increases of 200 and 113 percent, respectively. Production of red meat would decrease by 3,085,740 pounds annually in the long term from the present 22,334,550 pounds annually.

Wildlife habitat for big game, upland game birds and waterfowl would improve as would nongame habitat. Increased vegetation cover from mechanical and grazing treatments would reduce prairie dog habitat. Reservoir fisheries would increase by 23. Streambank wildlife habitat condition on high value riparian zones would reach satisfactory condition on 4,509 acres along an additional 128 miles of streams. Riparian zone condition would improve on 1,933 acres of saline seeps below reservoirs, a 221 percent increase.

Recreational opportunities on public lands would increase because of greater populations of big game and waterfowl. Fishing opportunities would increase with the addition of 17 fisheries reservoirs. ORV access and use on public lands would be hindered by construction of 400 miles of livestock management fences and mechanical treatments of 225,000 acres of public lands. Sport shooting of prairie dogs would continue since control of present populations is proposed in this alternative. No significant impact would occur to wilderness suitability or visual resources. Scenic values would be improved from denser vegetation in saline seeps, around 27 reservoirs and along 186 miles of streambank riparian zones.

Range improvements would be located to avoid cultural sites.

This alternative would result in a short term decrease in annual ranch income of $1,438,000 on 404 operations. Long term annual decreases would be $717,000 on 318 operations and long term annual increases $44,000 on 86 ranches. Permit value would decrease by $9,467,000 in the short term and $4,512,000 in the long term. Ranch related employment opportunities would decrease by 44 positions in the short term and 21 positions in the long term. The social well-being of 115 ranch families would increase in the long term while the social well-being of 424 ranch families would decrease. These decreases would be highly significant.

This alternative would increase retail sales in local businesses engaged in recreation and wildlife related retailing and services in Phillips, Blaine, Hill and Valley Counties. This would create employment for 7 people.

Ranchers' attitudes toward BLM would be negative due to decreased forage allocation to livestock and implementation of AMPs. Recreationist and environmentalist attitudes would be positive due to increased wildlife and reduced livestock conflicts.

Long term regional economic impacts resulting from this alternative would be insignificant even though earnings would decrease by $589,000 annually, employment by 78 positions and personal property taxes by $38,000 annually.

Total implementation cost of this alternative would be $17,774,900.



ALTERNATIVE E: NO GRAZING

This alternative would eliminate livestock grazing on public lands in the EIS area, affecting 904 allotments.

Watershed conditions would improve slightly with reductions in sediment yield of 25 percent and water yield of 9 percent. Water quality would improve significantly. Consumption of water by livestock would decrease from 3,523 acre-feet/year to zero.

By 2003 the acreage of good and excellent condition range would increase 16 percent while range in poor and fair ecological range condition would decrease by 26 percent. The condition of riparian, shoreline and saline seep vegetation would improve on public lands over the entire EIS area.

Vegetation on public lands would be allocated entirely to wildlife and non-consumptive uses. Production of red meat on public lands would decline from 22,334,550 pounds annually to zero in the short term.

Wildlife habitat would improve substantially for big game, upland game, waterfowl (except Canada geese) and nongame species (except those that thrive due to lower ecological range condition). Prairie dog towns could potentially expand from the present 1,715 acres to 239,000. This would be the reason for the slower improvement in watershed conditions than might otherwise be expected. Fisheries reservoirs would decline by 3 because of natural sedimentation. The streambank habitat condition on 186 miles of high value riparian zones (4,509 acres) would improve in the long term to satisfactory habitat condition.

Wilderness and visual values would improve with the elimination of livestock and the resulting increase in vegetation.

There would be no disturbance of cultural resource sites.

Implementation of this alternative would result in a total income loss of $12,311,000 annually on the 558 ranch operations involved. Grazing permit valuations would decrease by $31,258,000. There would be a loss of 117 ranch related employment opportunities. The social well-being of 744 ranch families would be decreased. The total impact of these decreases would be highly significant.

This alternative would increase retail sales of local businesses engaged in recreation and wildlife related retailing and services and create employment for 7 people.

Rancher attitudes would be extremely negative toward this alternative.

Regional economic impacts from implementation of this alternative would be moderately significant because of losses in annual earnings of $5,516,000 in the short term and $6,543,000 in the long term. Employment opportunities would decrease by 570 in the short term and 669 in the long term and personal property taxes would decrease $239,000 annually through the short and long term.

Total implementation of this alternative would cost about $15,126,500, primarily due to construction of 5,000 miles of exclosure fences around public lands.

Recreational hunting opportunities would significantly increase with substantial increases in big game populations. Fishing opportunities would decline slightly in the long term. Construction of 5,000 miles of fences would restrict ORV access. Prairie dog sport shooting opportunities would increase significantly.

ALTERNATIVE F: NO ACTION

This alternative would freeze the present range program as it is today. The 93 AMPs currently in effect would continue but no new range facilities would be constructed and no changes would be made in the levels of livestock use. Non-AMP status would continue on 1,184,008 acres and unallotted public lands would total 6,245 acres.

Watershed condition would deteriorate with an increase in sediment and water yields. Sediment yield would increase by 14 percent, water yield by 14 percent also while the quality of surface water would deteriorate in the long term. Consumptive use of water by livestock would remain at 3,523 acre-feet/year.

Good and excellent condition range would decrease by 12 percent and the acreage of fair and poor condition range would increase by 20 percent. The condition of riparian, shoreline and saline seep vegetation would decline or remain static on 6,611 acres. Vegetation allocations to livestock would stay at 319,065 AUMs in the short and long terms. Production of red meat would decrease by 3,066,840 pounds annually.

Wildlife habitat for big game, upland game birds, waterfowl and nongame species (except prairie dogs) would remain unchanged. Prairie dog habitat could increase to 239,000 acres. Reservoir fisheries would decrease to 12 as none of the present 27 reservoirs would be fenced. Streambank habitat condition on 6 miles of high value riparian habitat would decline from satisfactory to unsatisfactory habitat condition. There would be no increase in riparian vegetation in saline seeps below reservoirs.

Recreational opportunities on public lands would remain unchanged for big game and waterfowl hunting. The number of fisheries reservoirs would decrease to 12, reducing fishing opportunities. ORV access and use of public lands would remain unchanged. The opportunity for sport shooting of prairie dogs would increase significantly with the expansion of prairie dog towns to their biological potential of 239,000 acres. There would be no impact to wilderness in this alternative. Maintenance of current range improvements would be allowed in the Bittercreek WSA. There would be no significant impairment to visual resources if this alternative were implemented.

No disturbance of cultural sites would occur since there would be no development of range facilities.

This alternative would not affect "on paper" short term ranch income, ranch employment opportunities, permit value or the social well-being of ranch families. While there would appear to be no long term effects or changes on paper from the present situation in this alternative, declining range conditions would continually decrease the livestock forage base. This would eventually lower livestock production as discussed earlier.

There would be no implementation cost for this alternative.



Sharptailed Grouse

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1.1: Prairie Potholes Vegetation Allocation EIS Location Map 2

CHAPTER 1

PURPOSE and NEED

PURPOSE and NEED

The Prairie Potholes Environmental Impact Statement (EIS) analyzes the resource, social and economic impacts of instituting a rangeland management program in the northern portion of the Lewistown District of the Bureau of Land Management (BLM) in Montana.

The BLM is responsible for the management of livestock grazing on public lands in a manner that maintains or improves the public land resources including soil, water, vegetation and wildlife habitat. The Bureau's principal authority to manage public lands is found in the Taylor Grazing Act of 1934, Federal Land Policy and Management Act of 1976 and Public Rangelands Improvement Act of 1978.

This EIS is written in compliance with the National Environmental Policy Act of 1969, Council on Environmental Quality regulations and in specific response to litigation in the Natural Resources Defense Council et al. versus Rogers C. B. Morton et al. 1973 (U.S. District Court for the District of Columbia, ref. Case No. 1983-73).

The purpose of the EIS is to develop a livestock grazing program consisting of vegetation allocation necessary to equitably allocate the vegetation among competing consumptive uses and implementation of grazing treatments and range improvement projects to maintain or improve vegetation yields and watershed conditions. The result of the EIS will be used to implement decisions needed for management, protection and enhancement of the rangeland resources. The proposal would cover a 22 year period from the time actions are initiated.

SETTING

The Prairie Potholes EIS area of northern Montana (Map 1-1) is characterized by rolling prairies broken by glacial potholes and drainages which sometimes are sharply incised to include river breaks landforms. The Sweet Grass Hills and Bears Paw Mountains are landmarks in the region. Population in the area is mainly concentrated in the Milk River Valley. Many of the ranch operations are very remote from the river valley towns.

Total acreage in the eleven county EIS area is approximately 15.5 million acres, including 1.75 million acres of public lands under BLM management (see Map 1, Map Supplement). Most of the public lands are concentrated in Blaine, Phillips and Valley Counties and include substantial amounts of Land Utilization (LU) lands reacquired by the government under the Bankhead-Jones Act of 1937.

The EIS area includes a total of 904 allotments involving 637 ranch operations. Most of these include some grain farming in combination with livestock production. There are also 9 grazing associations in the EIS area. There are 6,245 acres of public lands that are unallotted to livestock grazing (Map 2, Map Supplement). These lands are administered through the Havre (Havre), Phillips (Malta) and Valley (Glasgow) BLM Resource Area Offices of the Lewistown District.

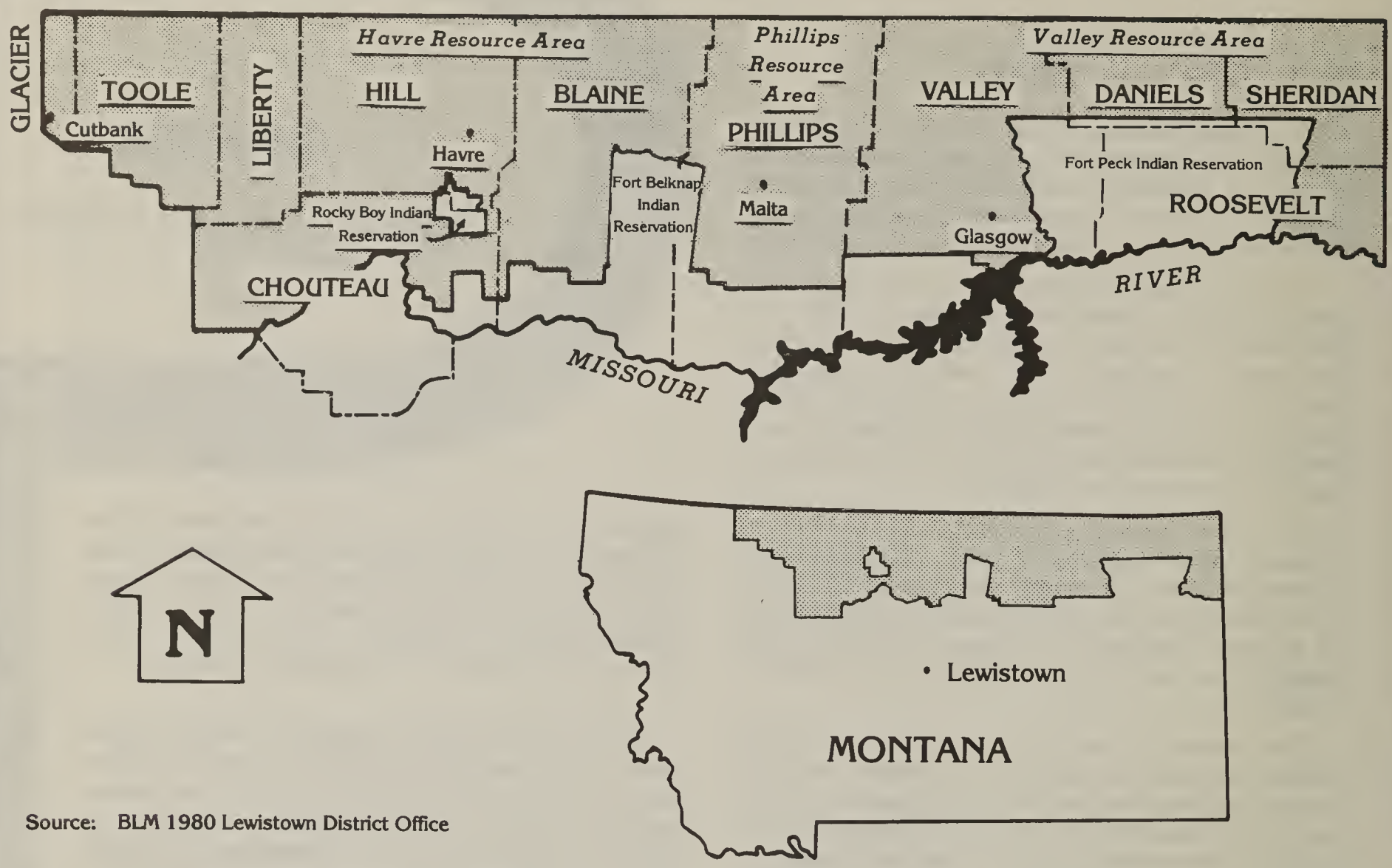
While there are large continguous tracts of public lands, the primary land ownership pattern is of scattered tracts of public lands intermingled with private and state lands. These land patterns strongly affect grazing management options. Private lands are usually located along drainage bottoms and on the more productive uplands. In addition to livestock grazing, these tracts provide wildlife habitat, recreation and activities compatible with multiple resource management.

MANAGEMENT GUIDANCE and RESOURCE COORDINATION

The administration of public lands involves the complex interdependence among lands of different ownership, uses, and capabilities. The EIS area contains private lands as well as lands managed by the National Park Service, Bureau of Indian Affairs, Water and Power Resources Administration, Corps of Engineers, the Montana Department of State Lands and the Montana Department of Fish, Wildlife, and Parks. Agency responsibilities are described in Appendix 1.1

Development of the proposed grazing management program is guided by mandates to manage the public lands for multiple use and sustained yield under the Federal Land Policy Management Act (FLPMA) of 1976 (90 Stat. 2743). The system begins with land use planning. This involves multidisciplinary resource inventories contained in the Unit Resource Analysis (URA) and social and economic data analyzed in the Planning Area Analysis (PAA). Management decisions are then developed in the Management Framework Plan (MFP).

Map 1-1 PRAIRIE POTHOLES VEGETATION ALLOCATION EIS LOCATION MAP



Source: BLM 1980 Lewistown District Office

A modified planning effort was initiated for the Prairie Potholes EIS area to expand on existing MFPs and to incorporate new policies and regulations. The following steps were involved:

1. Resource specialists reviewed base data from existing and updated URAs.

2. Existing MFPs were reviewed to utilize recommendations, decisions, and directives that would apply in vegetation allocation.

3. Area Managers and staff specialists developed resource enhancement objectives.

4. The multidisciplinary EIS team reviewed the objectives and recommended methods to accomplish them. Some objectives were modified because of insufficient data. Others were dropped as unattainable or inappropriate. Acceptable objectives were used to formulate the EIS alternatives.

5. The objectives and methods were submitted to the District Manager, Area Managers, EIS team and the Montana State Office EIS review team for review and critique. Additional coordination was accomplished by telephone, letter and meetings with other government agencies (Federal, state and local) and identified interest groups (see Chapter 5).

6. During the objectives development phase, public scoping meetings were held to ascertain public opinion about proposed alternatives and impact analysis.

7. From the objectives, an allotment matrix and map was developed to display specific objectives to apply to specific allotments for each alternative.

8. The alternatives were then submitted to the EIS team specialists for environmental impact analysis.

The objectives, methods, maps and matrices are available in the Lewistown District Office for review.

VEGETATION ALLOCATION

The EIS analyzes the impact of alternative allocations of vegetation. The analysis is based in part on information gathered through a BLM Soil Vegetation Inventory Method (SVIM) survey. This extensive survey of public lands was conducted in 1978 and 1979.

Full utilization of the data in the EIS is impossible because of delays in computer processing of data. Range condition mapping data from the SVIM survey, though, is used.

Since the full range of SVIM data is unavailable, EIS data and analysis will determine probable problem areas and areas that have a high potential for increased vegetation production. The allocations are only indications, and as such are described as "target allocations".

Following the EIS, individual allotment management plans (AMPs) will be prepared and the analysis developed in the EIS will help guide AMP development. The full range of SVIM data will also then be available to help select the proper grazing systems, treatments, range improvements and grazing adjustments to implement individual AMPs.

GRAZING TREATMENTS and SYSTEMS

Grazing treatments and systems are prescribed to alleviate specific problems and to achieve specific resource objectives (Appendix 1.2). Several commonly used systems, in cooperation with the livestock operator, are considered in the development of individual AMPs. Among these are: rest rotation, deferred, deferred rotation and seasonal use. Detailed descriptions of these systems are included in several standard grazing management references.

Rest treatments involve the removal of livestock from a specific pasture for one full growing season. These treatments promote plant reproduction, establishment of new plants and restoration of the vigor of mature plants of all species in the area.

Deferred grazing is the discontinuance of grazing by livestock on an area for a specific period of time during the growing season. Pastures are commonly deferred to allow key plant species to reach an advanced stage of development in their annual growth cycle before grazing begins. These treatments promote regeneration and maintain plant vigor for key plant species.

Rotation grazing means subdividing the range into units or pastures and grazing one pasture, after another in regular succession. Rotation is based upon the assumption that animals in large numbers make more uniform use of the forage and that rest is beneficial to the plant.

RANGE DEVELOPMENTS

Range developments are used where necessary to implement grazing systems. Additional developments are sometimes found to be necessary after the grazing systems have gone through one or more cycles.

Where water is a limiting factor, watering facilities are proposed. This improves distribution of livestock. Fences are proposed to control movement of livestock. Vegetation manipulation practices including mechanical treatments of clubmoss-blue grama sites, chemical control of noxious weeds and possible chemical control of sagebrush are proposed to improve the productivity of individual pastures in less than satisfactory condition that are not expected to improve in a reasonable amount of time under an intensive management system alone.



BLUE GRAMA and CLUB MOSS

ALLOTMENT MANAGEMENT PLANS

Intensive grazing management on public lands is accomplished through allotment management plans. Less intensive management is prescribed for non-AMP allotments (small, isolated allotted tracts). These areas are often "landlocked" by state and private lands; therefore, management of most non-AMP areas is generally minimal supervision by the BLM, primarily to ensure compliance and to evaluate resource conditions. Some non-AMP allotments are earmarked for consideration as future AMP development although more intensive analysis is necessary before implementation. A third category is unallotted public lands. These lands are usually unsuitable or inaccessible for livestock use, often being very small tracts surrounded by privately owned grain fields. In all cases, cooperation with other landowners is imperative.

An allotment management plan, prepared in consultation with the lessees or permittees involved, details livestock operations on an allotment. The AMP prescribes in detail the number and class of livestock (cow-calf, yearling, cattle, sheep) allowable on a grazing allotment that is identified on a map and/or a written legal land area description. The plan outlines methods of use (primarily by describing the grazing system employed) delineating use areas or pastures with specific use periods and permitted livestock numbers. Existing or proposed range developments are detailed by the AMP. Timetables for proposed range improvements or land treatments are also included.

An AMP identifies range[illegible] and other resource goals attainable through regulation of grazing as well as methods and frequency of evaluating the effects of the plan. An AMP may also state the responsibilities and schedules for the maintenance of range improvements and include coordination requirements with other agencies, use-adjustment agreements and cost-sharing agreements for range improvement work. Examples of typical goals for an AMP may be found in Appendix 1.3.

MONITORING and EVALUATION of AMPS

The key to the success of any grazing management plan is a system of monitoring and evaluation that ensures the stated objectives are being met. Each allotment has different potential, opportunities and problems, and, therefore, objectives differ. The AMP may involve various levels of management intensity. This may involve only documentation of present management. The monitoring and evaluation plan, therefore, must be flexible, cost effective and tailored to the needs of the AMP.

Typical monitoring activities include regular visits (preferably with the ranch operator) to observe how the system is operating and to resolve any problems. This involves checking utilization levels of each pasture after use, collecting actual use information and conducting any other annual studies called for in the AMP. These annual studies will include wildlife habitat, riparian vegetation, aquatic habitat and water quality, to the extent that such studies are pertinent to the AMP.

Experience in the EIS area has shown that trend changes slowly; therefore, evaluation studies will normally be conducted at longer intervals (possibly 10 years) than monitoring activities to measure changes in range condition, vegetation cover and watershed condition. Various trend study methods, including BLM's SVIM transects, Daubenmire canopy cover transects, photo stations or aerial photography would be employed to document trend in key areas. It is important to correlate climate with trend studies. Evaluations will be done on comparable years, comparability being determined by analysis of climate data and production of comparison areas. About 70 comparison areas, representing the major soil series in the EIS area, have been established. SVIM transects will be run on these comparison areas each year to measure response to climatic changes.

Modifications to AMPs will be made as indicated after interdisciplinary evaluations of the AMP monitoring systems. Such modifications (revisions) would include changes in the grazing system, livestock numbers, season of use, additional range developments or any combination of these as needed to attain the management objectives. Such revisions would be made at any time the need was determined. Problems would be dealt with in a timely manner.

AUTHORIZATION and CONTROL of LIVESTOCK GRAZING

Each range user is issued term permits through the BLM District Office. These permits specify allotment, period of use and numbers and classes of livestock. Changes in the period of use or numbers desired by the livestock operator which are outside the limits of the management plan but consistent with management objectives, must be requested in writing and approved in advance of the grazing period. Grazing use outside the limits of the management plan and without this prior authorization is considered trespass. Action would be taken by the BLM to eliminate trespass in accordance with regulations in 43 CFR 4150. Marking of livestock might be required to control livestock movement and ensure proper use. The preferred methods of marking would be ear tagging or paint marking. Keeping accurate count of livestock numbers and periods of use and utilization are essential.

Temporary non-renewable permits could be issued in years with better than average forage productivity, while temporary livestock reductions could be made when forage conditions were below average. This would ensure that overstocking does not occur during years of poor production and it would allow reasonable increases in use for better than average years. Permanent increases which are consistent with objectives of the AMP would be authorized only after temporary non-renewable use is made for a period of years and utilization and trend studies verify that additional permanent forage is available.

WILDERNESS CONSIDERATIONS

Under provisions of FLPMA any of the actions proposed may be permissible so long as wilderness values are not impaired. Until such time as Wilderness Study Areas (WSAs), including Instant Study Areas (ISAs), are designated or not designated as wilderness by Congress, all WSAs and ISAs must be managed to maintain wilderness potential.

A proposed action that could potentially impair an area either designated as wilderness or under interim management would be modified to accommodate wilderness management concepts according to current management guidelines. If or when designation of an area occurs, determinations would be made as to the intensity of use and developments that would be permitted in each area. Potential impacts have been identified in Chapter 4 for the purposes of comparing alternatives.

CHAPTER 2
THE ALTERNATIVES

VEGETATION ALLOCATION ALTERNATIVES AND THE PREFERRED ALTERNATIVE

Introduction

Six vegetation allocation alternative programs, including BLM's preferred alternative, are analyzed in this DEIS to provide readers and decisionmakers a means of examining the impacts that would occur in any particular course of action. The alternatives are titled: (A) Enhanced Combined Vegetation Uses, (B) Continuation of Present Management (the Preferred Alternative), (C) Enhanced Livestock Forage, (D) Enhanced Watershed Value and Wildlife Habitat, (E) No Grazing and (F) No Action.

Most of these alternatives include grazing treatments and systems, range developments and AMPs. Appendix 2.1 describes methods and range developments proposed. To meet the resource objectives of each alternative (Appendix 1.2), various types of range developments and treatments would be applied through various grazing systems or combinations of systems. In addition to the specific proposals discussed in each alternative, several recommended methods to accomplish objectives are not analyzed in this document. These methods—chemical sagebrush control, water spreaders, prescribed burning, wildfire management, fertilization and mowing—cannot be quantified as to acreage or location at this time. If these practices are proposed during the development of AMPs, a site-specific environmental assessment will be prepared.

The alternatives are described in both the short and long term. The short term is a 7 year implementation period during which all proposed actions, including mechanical treatments and construction of range facilities, would take place. All responses to range developments would be assumed to take place in the long term, the 15 years after implementation of an action. Although several soil subgroups respond rapidly to management practices and/or land treatments and could be expected to respond sooner, this response is analyzed as taking place in the long term.

The use of forage by livestock could be increased either through permitting additional numbers and/or extending the livestock grazing season in Alternatives A, B and C. In Alternative D increased livestock use would be allowed through permitting additional livestock numbers only.

Non-consumptive vegetation allocations, that portion of the forage crop left unused after proper use level grazing by livestock and wildlife (approximately 50 percent of the total vegetation in Alternatives A, B and C, and 66 percent in Alternative D) would be reserved for wildlife habitat, watershed protection and other uses. Wildlife would also have the use of all non-forage vegetation; i.e., all vegetation not normally grazed by any of the large wild or domestic herbivores. Under proper use allocations for non-consumptive vegetation uses, Alternatives A, B, C and D would equal and, in most cases, exceed the amount of vegetation removed by consumptive use.

Due to the limited data on vegetation and production as discussed in Chapter 1, several assumptions have been made in computing allocation levels for the various alternatives. Since these assumptions are based on professional judgement and current ecological range condition information in the EIS area, it is believed that the allocations are valid. However, until the validity of the allocations can be verified by BLM approved field surveys and studies on allotments, they will be considered as "target allocations." See Appendix 2.2 for the descriptions of the computations made to arrive at the allocations to be found in Appendix 2.3. Assumptions made in the computations for current vegetation allocations are as follows:

1. Livestock presently utilize 94 percent (319,065 AUMs) of the allocated forage (47 percent of the total forage) according to existing licensed use.

2. Wildlife now utilize about 6 percent (20,538 AUMs) of the allocated forage (3 percent of the total forage according to Montana Department of Fish, Wildlife and Parks population estimates). BLM biologists and range conservationists agree that the present wildlife (big game) populations in the EIS area are adequately provided for under present allocations. Due to different diet preferences between livestock and wildlife, an AUM for cattle cannot be converted directly to deer unit months other than as an AUM represents a given number of pounds of forage or food.

3. With proper consumptive use assumed, forage reserved for plant maintenance and watershed protection is 50 percent (339,603 AUMs).

Cost estimates supplied for each alternative are made with the understanding that any proposed range development will be modified or reduced in scale to avoid cultural sites that would require major excavation.

Commitments of manpower, materials, fuel and money expended during the implementation of Alternatives A-E would be irretrievable and irreversible. The only other irretrievable losses would be as follows:

> Alternatives E and F would result in irretrievable losses to vegetation production because of the potential wide expansion of prairie dogs. Alternatives D and E would result in irretrievable losses in permitted AUMs to livestock. Alternative C would cause irretrievable losses in prairie dogs and in sport shooting of them. Alternatives C, D and E might result in the irretrievable loss of several ranch operations because of the losses in income, causing a consequent loss in regional earnings also.

Alternatives A-D might result in irretrievable and irreversible losses to cultural resources should any cultural site be accidently destroyed.

ALTERNATIVE A: ENHANCED COMBINED VEGETATION USES

This alternative provides balanced vegetation allocations to non-consumptive uses for wildlife habitat, watershed, soil and scenic quality protection, and recreation as well as to consumptive uses for livestock and wildlife. Alternative A initially allocates 319,065 AUMs to livestock, 20,538 AUMs to wildlife and 339,603 AUMs to non-consumptive uses. Long term allocations, based on the projected increases in vegetation production, are 397,721 AUMs to livestock, 25,734 AUMs to wildlife and 423,455 AUMs to non-consumptive uses (see Table 2.1 for summaries of allocations, mechanical treatments and grazing treatments and other data).

Alternative A proposes development of 419 AMPs on 1,062,754 acres of public lands, revision of 93 existing AMPs on 558,986 acres, non-AMP designation on 392 allotments totaling 121,253 acres and 6,245 acres of unallotted public lands. (For allocations to individual allotments and other specific allotment information, see Appendix 2.3. For land status refer to Map 1, *Map Supplement* and for AMP and non-AMP status, see the Allotment Overlay.)

In the short term 15 percent or 679 acres of the high value streamside riparian zones on public lands would receive continuous rest. This would be done by fencing 28 miles of streams and resting it for 4-10 years to obtain 90 percent of the optimum streambank cover (Appendix 3.9). The remaining 158 miles (3,830 acres) of high value streamside riparian zones would be considered for rest or deferred grazing treatments. In addition, 575 seeps averaging 1 acre in size and 11 fishing reservoirs totaling 70 acres would be rested continuously for a period of 4-10 years by fencing. Rotational grazing and rest treatments would be applied in exclosures following the initial rest.

On allotments which are in more than 50 percent fair or poor ecological range condition, grazing would be periodically deferred until peak flowering dates of key plant species (Table 3.8). This includes 138 proposed AMP allotments totaling 335,048 acres and 20 existing AMP allotments of 156,195 acres. The remaining 281 proposed AMP allotments, totaling 727,706 acres, would be considered for rest, deferment or rotation grazing treatments to attain 80 percent good ecological range condition or to meet the other resource objectives of this alternative. This would also apply to the remaining 73 AMP allotments of 402,791 acres (all but 7 of the 93 current AMP allotments have rest and deferment treatments in effect). See Table 2.1 for summaries by alternative.

Mechanical treatments on 281,000 acres, primarily on clubmoss-blue grama sites, would include contour furrowing, scalping, pitting, chiseling, plowing and seeding. Contour furrowing and scalping treatments would include interseeding of native species and introduced legumes. Mechanical treatment areas would require rest or deferment for 1-2 years and might involve any of 512 proposed and existing AMP allotments which have soils suited for treatment (Appendices 2.4 and 3.2) but would be done primarily on 449 allotments totaling 1,333,714 acres which are dominated by soil subgroups 1, 2 and 5.

In support of grazing or land treatments, about 650 miles of pasture and allotment boundary management fences and 163 miles of exclosure fences along with an estimated 50 cattle guards and an undetermined number of shade sources and livestock insect repellent devices/oilers would be built.

Proposed water developments (retention or pit reservoirs for the most part but possibly including wells, springs or catchments) would total 1,000. Chemical treatments are proposed on 2,200 acres of noxious weeds (mostly leafy spurge) using 2,4D and Tordon and 1,100 acres of prairie dog towns using zinc phosphide treated seed.

The estimated cost of range improvements in this alternative would be $14,356,300 based on current average cost per improvement (Appendix 2.5).



ALTERNATIVE B: CONTINUATION OF PRESENT MANAGEMENT (THE PREFERRED ALTERNATIVE)

This alternative has been selected as the preferred alternative because of two factors. Analysis of the alternative shows that about 95 percent of the primary management goal of having public lands in 80 percent good or better ecological range condition can be reached through implementation of this alternative at a cost of about $8,401,500. To attain the remaining 5 percent of this goal on all potential AMP allotments would cost an additional $5,954,800. In addition, if unclassified lands (not classified as to ecological range condition-sandstone and shale outcrops) are taken from the total acreage of public lands, this alternative would reach about 99 percent of the ecological condition goal. This alternative would also place under AMPs about 63 percent of the total public lands suitable for AMP development.

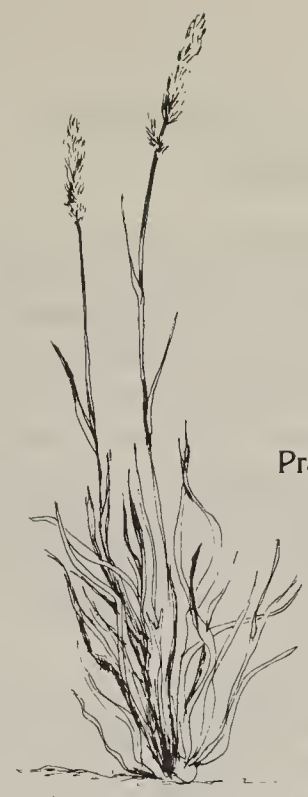
The second factor in making Alternative B the preferred alternative is in recognition of public comment. Public response gathered during the public involvement process revealed a strong desire for leaving things as they are or at best a low level program that involved no major change in the status quo. The multiple use concept was also endorsed.

The resource objectives of this alternative are the same as for Alternative A but would be applied only to the 93 existing AMPs and the 70 proposed AMPs deemed high priority, compared to 419 proposed AMPs in Alternative A. The 349 allotments proposed for AMPs in Alternative A would be considered as potential AMPs in this alternative. This alternative is based on the average AMP implementation rate of 10 per year, the rate in the Prairie Potholes EIS area during the 10 years prior to the National Resources Defense Council lawsuit.

The 70 proposed AMPs were selected by a system that considered acreage, range condition, potential productivity and wildlife habitat values (Appendix 2.6). On-the-ground inspections may reveal the need to substitute allotments as yet unscheduled. While it is expected that AMPs would continue to be developed beyond the short term implementation period, the analysis is limited to what is expected to occur in the short term to compare all six alternatives by a common time period.

In this alternative the initial allocation of 319,065 AUMs to livestock grazing, 20,538 AUMs to wildlife and 339,603 AUMs for non-consumptive use are the same as the current permitted use. The long term allocation is based on projected vegetation production increases allocated as follows: 366,846 AUMs for livestock grazing, 23,758 AUMs for wildlife and 390,604 AUMs for non-consumptive uses (Table 2.1).

To support these allocations, 93 existing AMPs totaling 558,986 acres of public lands would be revised, 70 new AMPs affecting 455,009 acres would be developed



Prairie Junegrass

and 349 allotments of 607,745 acres of public lands would be considered for potential AMPs. Non-AMP and unallocated acreage would be the same as in Alternative A.

In the short term a total of 388 acres of high value streamside riparian zones (15 percent of the 107 miles total stream length in the proposed and existing AMPs) would receive continuous rest by fencing for 4-10 years to obtain 90 percent of optimum streambank cover. Also 370 1-acre seeps and 7 fishing reservoirs totaling 36 acres would be rested for 4-10 years by fencing.

Due to fair and poor range condition, grazing would be periodically deferred until the peak flowering dates of key plant species on 51 proposed and 20 existing AMPs totaling 406,339 acres. The remaining 19 proposed and 73 existing AMPs totaling 607,656 acres would be considered for rest, deferment or rotation grazing treatments to attain 80 percent good ecological range condition or to support other resource objectives. This is in addition to grazing treatments which would continue on existing AMPs.

Mechanical treatments, as discussed in Alternative A, would total 175,000 acres in this alternative. Mechanical treatments could be done on any or all of the 70 proposed or 93 existing AMPs but would primarily affect 127 allotments totaling 749,243 acres in allotments dominated by soil subgroups 1, 2 and 5.

About 300 miles of pasture and/or allotment boundary fences would be needed to support grazing or mechanical treatments in addition to 106 miles of exclosure fences. There would also be an estimated 30 cattle guards and an undetermined number of shade sources and livestock insect repellent devices/oilers in this alternative along with 450 new water sources. Chemical control of noxious weeds and prairie dogs would be the same as in Alternative A.

The estimated cost of range improvements is $8,401,500 based on current average cost per improvement (Appendix 2.5).

ALTERNATIVE C: ENHANCED LIVESTOCK FORAGE

This alternative emphasizes forage production and vegetation allocation for domestic livestock use. AMPs would be designed to increase vegetation production and allocation of forage to livestock on all potential AMP allotments. No additional wildlife, watershed or recreation enhancement objectives would be considered beyond maintenance of current conditions. This analysis shows the impacts to other resources when emphasis is placed on domestic livestock use while still maintaining adequate protection of the basic vegetation resource.

Target vegetation allocations in this alternative are based on the Soil Conservation Service (SCS) recommended stocking rates by ecological range site and condition class. These recommended stocking rates are, in most cases, higher than rates currently used by BLM (which are based on late 1950's and early 1960's range surveys). Two assumptions are inherent in using the SCS rates—adequate livestock watering facilities are available and livestock are properly distributed. On some allotments, SCS guidelines indicate a lower stocking rate than presently allowed. Thus target reductions are indicated. (See Appendix 2.2 for target allocations.)

This alternative initially allocates 374,064 AUMs to livestock, 20,538 AUMs to wildlife, and 394,602 AUMs to non-consumptive use during the short term. Long term allocations, based on projected vegetation increases, are 618,215 AUMs to livestock, 20,538 AUMs to wildlife, and 648,006 AUMs to non-consumptive uses.

AMPs would be developed in this alternative as follows: 419 new AMPs on 1,062,754 acres of public lands, revision of 93 existing AMPs on 558,986 acres, 392 allotments designated as non-AMPs on 121,253 acres and 6,245 acres of unallotted public lands. (See Appendix 2.3 for individual allotment allocations and other specific allotment information.)

This alternative does not consider any rest or deferment grazing treatments proposed specifically for high value streamside riparian zones, fisheries reservoirs or seeps. The areas may be included in rest or deferment treatments in meeting range resource objectives.

Allotments proposed for periodic spring deferment due to a predominance of fair and poor condition range would total 138 proposed AMPs of 335,048 acres and 20 existing AMPs totaling 156,195 acres. The remaining 281 proposed AMPs and 73 existing AMPs (totaling 1,130,497 acres) would be considered for rest deferment or rotational grazing treatments to attain 80 percent good ecological range condition or to meet other resource objectives such as increased forage production. All but 7 of the 93 existing AMPs have rest and deferment treatments currently in effect.

Mechanical treatments, as discussed in Alternative A, are proposed on 920,000 acres. See Appendix 2.4 for the total acres suitable for mechanical treatments by allotment. This would primarily involve 449 allotments of 1,333,714 acres dominated by soil subgroups 1, 2 and 5.

In this alternative pasture and allotment boundary fences, water developments, cattle guards, shade sources and livestock insect repellent devices/oilers would be the same as proposed in Alternative A. Chemical control of noxious weeds is proposed on 2,200 acres along with 1,715 acres of prairie dog control.

The estimated cost of range improvements is $31,655,800 based on current average cost per improvement (Appendix 2.5).



ALTERNATIVE D: ENHANCED WATERSHED VALUE AND WILDLIFE HABITAT

In this alternative particular emphasis would be placed on the watershed, wildlife, and, to a limited degree, recreational resources. This analysis shows the benefits and disadvantages of giving priority in vegetation allocation and range management to resources other than livestock forage production while allowing light to moderate grazing use by livestock.

Initial livestock allocations in this alternative are 30 percent lower than the current permitted use of 319,065 AUMs because of riparian exclosure fences and the deferment of spring grazing until July 1.

Initial allocations are 223,933 AUMs to livestock grazing, 20,538 AUMs to wildlife and 434,735 AUMs to non-consumptive uses. Long term allocations, based on projected increases in vegetation production, are 274,983 AUMs to livestock grazing, 61,614 AUMs to wildlife and 491,281 AUMs to non-consumptive uses. See Table 2.1 for summaries of allocations by alternative and Appendix 2.3 for specific allotment information.

The total number of allotments and acreage proposed for AMPs in this alternative is the same as in Alternatives A and C. Grazing treatments and AMP objectives would be governed by the resource objectives specifically proposed for this alternative.

In the short term 4,509 acres of high value streamside riparian zones would be rested continuously for 4-10 years along with 1,933 1-acre seeps and 27 fishing reservoirs totaling (169 acres) by fencing.

Spring deferment of grazing until July 1 would be scheduled on all allotments presently having permitted spring use. This would involve 488 allotments and 1,612,553 acres which, in conjunction with excluded areas, would reduce livestock allocations by 95,132 AUMs. All 419 proposed AMP allotments and 93 existing AMP allotments would be considered for rest, deferment or rotation grazing treatments to meet resource objectives for this alternative.

The reduced length of the grazing season would result in less grazing treatments and correspondingly fewer pastures and miles of fences than proposed in either Alternatives A or C.

Mechanical and associated grazing treatments as discussed in Alternative A are proposed on 225,000 acres in this alternative. About 400 miles of pasture and/or allotment boundary fences, 740 miles of riparian exclosure fences, 50 cattle guards and an undetermined number of shade sources and livestock insect repellent devices/oilers are also proposed.

Water developments and noxious weed control in this alternative would be the same number as in Alternative A. Control of prairie dogs would be done to maintain but not exceed the current 1,715 affected acres.

This estimated cost of range improvements in this alternative is $17,774,900 based on current average cost per improvement (Appendix 2.5).

ALTERNATIVE E: NO GRAZING

No domestic livestock would be permitted to graze on public lands in this alternative. The analysis provides a basis of comparison for the environmental, social and economic consequences of the other alternatives.

Current grazing privileges would be revoked, including the present 93 AMPs. All agreements with cooperative grazing districts would be affected as well. No range improvements would be built or maintained unless the improvements were considered necessary for resource programs such as watershed or wildlife. Salvage rights would be granted or cash reimbursement made to ranchers who had contributed to range improvement facilities.

This program would eliminate the current permitted livestock use of 319,065 AUMs. In the worst-case analysis, BLM would fence public lands to prevent livestock trespass. Five thousand miles of fences would be necessary for this undertaking, costing $15,126,500 according to 1980 cost estimates (Appendix 2.5).



ALTERNATIVE F: NO ACTION

This alternative would "freeze" the current range program as it is today. AMPs in effect would continue but no new range developments (reservoirs, fences, mechanical treatments, pipelines, etc.) would be constructed. Changes in levels of permitted livestock use would not be allowed regardless of need. No new AMPs would be implemented, no range facilities would be constructed. Maintenance of current improvements would be allowed, however.

Essentially all future options in range management would be eliminated in this alternative. There would be no opportunity to correct erosion problems, to increase or decrease livestock numbers, to change kinds of livestock, to adjust seasons of use or to improve range management.

By freezing the present use of vegetation, BLM and the public can view the consequences of continuing present range trends in the Prairie Potholes EIS area. The analysis shows future conditions of soil, vegetation and watershed.

Initial and long term allocations under this alternative would be 319,065 AUMs to livestock, 20,538 AUMs to wildlife, and 339,603 to non-consumptive use as summarized in Table 2.1 and detailed by allotment in Appendix 2.3. As no new improvements would be proposed in this alternative, no additional costs above present maintenance expenditures would be incurred.

TABLE 2.1 SUMMARY DATA FOR SIX ALTERNATIVES

	EXISTING SITUATION	ALTERNATIVE A ENHAN.COMBINED VEG. USES	ALTERNATIVE B CONT. OF PRESENT MGMT.	ALTERNATIVE C ENHANCED LVSK. FORAGE	ALTERNATIVE D ENHANCED WATER&WILDLIFE	ALTERNATIVE E NO LIVESTOCK GRAZING	ALTERNATIVE F NO ACTION
Initial Allocation (AUMs)							
Livestock	319,065	319,065	319,065	374,064	223,933	-0-	319,065
Wildlife	20,538	20,538	20,538	20,538	20,538	20,538	20,538
Non-Consumptive Uses	339,603	339,603	339,603	394,602	434,735	658,668	339,603
	679,206	679,206	679,206	789,204	679,206	679,206	679,206
Long Term Allocation (AUMs)							
Livestock		379,721	366,846	618,215	274,983	-0-	319,065
Wildlife		25,734	23,758	20,538	61,614	61,614	20,538
Non-Consumptive Uses		423,455	390,604	648,006	491,281	630,080	339,603
		846,910	781,208	1,286,759	827,878	691,694	679,206
Proposed AMPs #s (ac)		419(1,062,754)	70(455,009)	419(1,062,754)	419(1,062,754)	-0-	-0-
Existing AMPs #s (ac)	93	93(558,986)	93(558,986)	93(558,986)	93(558,986)	-0-	93(558,986)
Non-AMPs #s (ac)	811	392(121,253)	741(728,998)[1]	392(121,253)	392(121,253)	-0-	811(1,184,008)
Unallotted acres	6,245	6,245	6,245	6,245	6,245	1,749,238	6,245
		1,749,238	1,749,238	1,749,238	1,749,238	1,749,238	1,749,238
REST FROM LIVESTOCK GRAZING FOR 4-10 YEARS							
High Value streamside riparian # mi. stream (ac. rested)	-0-	28(679)	16(388)	-0-	186(4,509)	-0-	-0-
Reservoirs and acres # (ac)	-0-	11(70)	7(36)	-0-	27(169)	-0-	-0-
Seeps and acreage # (ac)	-0-	575(575)	370(370)	-0-	1,933(1,933)	-0-	-0-
AMPs RANGE CONDITION AND PROPOSED TREATMENT BREAKDOWN							
Proposed AMPs number of allotments (acreage)							
Less than 50% good automatically receive periodic spring deferment.		138(335,048)	51(250,144)	138(335,048)	138(335,048)[2]	-0-	-0-
50-80% good grazing treatment to achieve 80% good.		137(461,140)	18(201,330)	137(461,140)	137(461,140)[2]	-0-	-0-
80% and over may receive grazing treatment due to other resource objectives.		144(266,566)	1(3,535)	144(266,566)	144(266,566)[2]	-0-	-0-
TOTALS		419(1,062,754)	70(455,009)	419(1,062,754)	419(1,062,754)		
Existing AMPs							
#s (ac), less than 50% good		20(156,195)	20(156,195)	20(156,195)	20(156,195)	-0-	20(156,195)
Total number of allotments and acreage #s (ac) in less than 50% good condition (existing and proposed AMPs).		158(491,243)	71(406,339)	158(491,243)	158(491,243)	-0-	-0-

TREATMENTS IN AMPs DUE TO SOILS RESOURCE OBJECTIVES
(resource objectives APPENDIX 1.2)

Proposed AMPs:

1. Mgmt alone (grazing treatment rest and/or deferred) Allotments dominated by Subgroups 3, 4, 6, 12, 13, 15[4]	55(195,371)	28(172,097)	55(195,371)	199(461,937)	-0-	-0-
2. Land Treatment and Grazing Treatment[3] Allotments dominated by Subgroups 1, 2, 5[4]	364(867,383)	42(282,912)	364(867,383)	220(600,817)	-0-	-0-
TOTALS	419(1,062,754)	70(455,009)	419(1,062,754)	419(1,062,754)	-0-	-0-

Existing AMPs:

1. Management alone (rest & deferred treatments) Allotments dominated by Subgroups 3, 4, 6, 12, 13, 15[4]	8(92,655)	8(92,655)	8(92,655)	47(239,988)	---	93(558,986)
2. Land Treatments and Grazing Treatments Rest and Deferment Allotments dominated by Subgroups 1, 2, 5[4]	85(466,331)	85(466,331)	85(466,331)	46(318,998)	---	---
TOTALS	93(558,986)	93(558,986)	93(558,986)	93(558,986)		

(Acres of all riparian zones are included in 1 and 2 above as inclusions in Soil Subgroups 6, 7, and 17.)

Acres of mechanical treatment (1-2 years rest)	281,000	175,000	920,000	225,000	-0-	-0-
Water Sources (approximately 1 per sq. mi.)	1,000	450	1,000	1,000	-0-	-0-
Miles Management Fence	650	300	650	400	-0-	-0-
Cattle Guards	50	30	50	50	385	-0-
Miles of Exclosure Fence	163	106	-0-	740	5,000	-0-
Acres	1,324	794	-0-	6,611	1,749,238	-0-
AUMs	554	330	-0-	2,743	-0-	-0-
An unquantified number of shade sources, snow catchment and livestock insect repellent/oiler devices are proposed in Alternatives A, B, C and D.						
Noxious Weed Control Acres (Chemical)	2,200	2,200	2,200	2,200	-0-	-0-
Prairie Dog Control Acres (Chemical)	1,100	1,100	1,715	-0-	-0-	-0-
Implementation Costs	14,356,300	8,401,500	31 655,800	17,774,900	15,126,500	-0-

1. Includes 349 potential AMPs involving 621,404 acres.
2. All allotment acreage will be affected by spring rest or deferment 4/1 - 6/30 and/or by various grazing and land treatments.
3. Includes 83,000 of crested wheatgrass.
4. Subgroups 7, 8, 9, 10, 11, 14, 16, 17, 18 do not domiate in any AMP allotment.

Source: BLM, 1980.

TABLE 2.1: CONTINUED

SUMMARY OF ENVIRONMENTAL CONSEQUENCES BY ALTERNATIVES

A comparison of the impacts on major resources is presented in Table 2.2. It was found that there would be no significant impacts and no significant differences in impacts between alternatives for climate, air quality and geology. These components are therefore not included in the summary table. Cultural resources are not included in this discussion since mitigating measures would preserve the physical evidence and information from disturbed sites.

Quantification of resource factors is given when possible. The reference point for determining change is the existing situation. During the years 1981-88, the selected grazing management alternative or combination of alternatives would be implemented. Short term impacts are those that would occur during this implementation period, primarily from range developments. Long term impacts would occur by the year 2003. The following discussion emphasizes the most significant impacts by alternative. The preferred alternative, based on benefit-cost analysis and public comment, is Alternative B, "Continuation of Present Management."

ALTERNATIVE A: ENHANCED COMBINED VEGETATION USES

Moderately significant decreases in sediment (58 percent) and water yields (51 percent) would result from this alternative in the long term. Water quality would improve significantly. The allocation to non-consumptive uses of 50 percent of any increase in vegetation production would result in additional residual vegetation cover to reduce runoff and impede erosion. Short term soil disturbances of range developments would lead to relatively insignificant soil losses.

Public lands in good and excellent ecological range condition would improve significantly (35 percent); fair and poor condition range would decrease by 58 percent, in the long term. On the remainder, plant vigor, litter and water infiltration would improve due to proper use grazing and grazing treatments. High value riparian zones would benefit by rest treatments of 4-10 years or from periodic rest and deferment treatments. The result of this alternative would be a significant 25 percent increase from the present situation in allocations (by AUMs) to livestock, wildlife and non-consumptive uses in the long term. Red meat production would increase by 5,505,885 pounds annually.

The increased forage allocations to wildlife with the improvement in the quantity and quality of habitats (especially in riparian zones) would result in significant benefits to wildlife species. Deer and antelope populations are projected to double. Rest and deferment on AMPs, with mechanical treatments, would improve habitat for upland game birds and nongame wildlife by increasing residual vegetation. Creation of new water sources, including waterfowl nesting islands coupled with the increase in residual vegetation necessary for nesting, would double duck production and increase the number of Canada geese by 43 percent. Fisheries reservoirs would increase from 27 to 39. The most significant increase of habitat would occur in riparian vegetation along streams and surrounding reservoirs. A 64 percent reduction in the acreage of prairie dog towns would be the only significant negative impact to wildlife in this alternative.

Hunting and fishing opportunities would be significantly improved. Recreation access and ORV travel would decrease because of the construction of fences and mechanical treatments. Recreational shooting of prairie dogs would be significantly reduced. Impacts to wilderness and visual resources would be insignificant.

A moderately significant long term economic gain ($495,000 annually) would be realized by 395 ranch operations, amounting to 5.8 percent over the current annual livestock income. Permit values and ranch employment would increase by $7,804,000 and 32 people, respectively. The social well-being of 527 ranch families would be improved by these increases.

This alternative would increase sales of local businesses engaged in recreation and wildlife related retailing and services in Phillips, Blaine, Hill and Valley Counties, increasing earnings by $37,000 annually and employment by 4 people. These increases would be insignificant.

Ranchers' attitudes/perceptions of BLM would be positive toward increased forage allocation to livestock. Attitudes toward AMP development would be both positive and negative because this is a high level development program. The attitudes of envrionmentalists and recreationists toward the vegetation allocation would be positive.

In the long term regional earnings would increase $2,087,000 annually and provide employment for 186 people. Personal property tax would increase by $54,000 annually.

ALTERNATIVE B: CONTINUATION OF PRESENT MANAGEMENT (THE PREFERRED ALTERNATIVE)

Erosion would improve in the long term as sediment yield would be reduced by 26 percent and water yield by 22 percent. Soil losses from range developments would be an insignificant short term consequence. Consumptive water use by livestock would increase minimally by 528 acre-feet/year. More vegetation production would result in allocating 50 percent of the increase to non-consumptive uses, improving watershed protection.

Public lands in good and excellent ecological range condition would increase by 26 percent and acreage in poor and fair condition would decrease by 43 percent.

Forage production would increase by 15 percent overall. Riparian vegetation along streams and below reservoirs would significantly increase. Livestock, wildlife and non-consumptive uses would all realize a 16 percent increase of AUMs from their present allocations. Range developments would be highly significant on affected allotments but the overall affect would be moderately significant. Red meat production would increase by 3,344,670 pounds annually.

On the 163 present and new AMP allotments, deer and antelope numbers are projected to double. Moderately significant increases in residual vegetation from rest and deferment would improve habitat conditions for upland game birds and nongame wildlife on these allotments. Ducks and geese would increase by 22 and 19 percent, respectively, principally due to the construction of reservoirs and nesting islands. Almost 60 percent of the high value riparian habitat, reservoir shoreline and saline seep vegetation would improve significantly because of rest for 4-10 years or periodic rest and deferment treatments. Riparian areas not receiving these treatments would either decline or remain static.

There would be a loss of one fisheries reservoir. The number of prairie dog towns would remain the same but the total acreage of these towns would be reduced 64 percent.

On affected allotments, hunting opportunities would improve significantly. A moderately significant increase in fishing quality would occur from the elimination of livestock from 25 percent of the reservoir fisheries. Access and ORV travel would decrease from fences and surface disturbances caused by mechanical treatments. Opportunities for prairie dog shooting would be significantly reduced. Effects on wilderness and visual resources would be insignificant.

A moderately significant long term economic gain ($296,000 annually) would be realized by 179 ranch operations, amounting to 3.4 percent over the current annual livestock income. Permit values would increase by $4,635,000 and ranch employment by 22 people. These increases would improve the social well-being of approximately 239 ranch families.

This alternative would increase sales of local businesses engaged in recreation and wildlife related retailing and services in Phillips, Blaine, Hill and Valley Counties, increasing earnings by $22,000 annually and employment by 2 people. These increases would be insignificant.

The attitudes of ranchers toward BLM resulting from increased forage allocations would be positive; however, attitudes toward AMPs would be both positive and negative because some ranchers might resent not having the opportunity to improve their range through AMP development. The attitudes of recreationists and environmentalists would be mixed because they might feel too little was being done for the wildlife and watershed resources.

Long term regional earnings would increase by $999,000 annually and employment would increase by 91 people. Personal property taxes would increase by $27,000 annually.

The total implementation cost of this alternative would be $8,401,500.

ALTERNATIVE C: ENHANCED LIVESTOCK FORAGE

Sediment and water yields would decrease by 68 and 51 percent, respectively, in the long term, representing highly significant decreases. Consumptive use of water by livestock would increase by 2,697 acre-feet/year. Water quality would improve significantly. Public lands in good and excellent ecological range condition would increase by 44 percent and range in poor and fair ecological condition would decrease by 73 percent. Increased vegetation production on upland areas, new water sources and other range developments would relieve grazing pressure on floodplains and riparian zones, resulting in increased stream channel stability.

This alternative would increase livestock forage by 94 percent, a highly significant amount. Livestock numbers could be increased by 49 percent and the grazing season lengthened by 33 percent. Noxious weeds would be controlled and prairie dogs eradicated. Forage allocations to non-consumptive uses would double, a highly significant increase in vegetation for watershed protection and wildlife habitat. Red meat production would increase by 20,940,465 pounds annually in the long term.

Deer and antelope are projected to increase by 50 percent in this alternative. Residual vegetation produced from rest and deferment on AMPs plus the topographic and vegetation cover provided from mechanical treatments would improve habitat conditions for upland game birds and nongame wildlife. Duck and goose production would increase by 114 and 43 percent, respectively. Fisheries reservoirs would increase from 27 to 32. A 9 percent increase in high value streamside riparian vegetation in satisfactory habitat condition would occur. One thousand seven hundred and fifteen acres of prairie dog towns would be eliminated.



No significant increase in hunting or fishing quality would occur because increased conflicts with livestock would overshadow gains in wildlife populations. Recreational access and ORV travel would be hindered by the mechanically treated acres (53 percent of the public lands) and construction of management fences. Prairie dog sport shooting would be eliminated in this alternative since prairie dogs would be eradicated.

The cumulative effect of 920,000 acres of mechanical treatments would detract from the scenic quality and could lower Class III areas to Class IV. Grazing systems would have the long term potential to improve scenic quality in Class IV landscapes. No significant impacts would occur to wilderness suitability.

Range improvements would be located to avoid disturbing cultural sites.

This alternative would result in a short term annual increase in ranch income of $400,000 on 293 ranches and a short term annual decrease on 95 ranches of $142,000. In the long term annual increases in ranch income on 379 ranches would total $1,974,000 while annual decreases would occur on 17 ranches totaling $38,000. Permit values would increase by $5,267,000 in the short term and $30,831,00 in the long term. Ranch employment would increase by 22 people in the short term and 127 people in the long term.

Social well-being would be increased for 391 ranch families in the short term and 505 in the long term. Social well-being would be decreased for 127 ranch familes in the short term and 23 in the long term. These long term increases would be highly significant.

This alternative would increase sales in local businesses engaged in recreation and wildlife related retailing and services in Phillips, Blaine, Hill and Valley Counties, increasing earnings by $19,000 annually and employment by 2 people. These increases would be insignificant.

The attitudes of ranchers and their perceptions of BLM would be positive towards increased livestock forage allocations and the AMPs facilitating these increases. The attitudes of environmentalists and recreationists would probably be negative in both the short and long term as they would feel that their respective interests had been slighted.

Regional economic impacts would be a short term annual increase of $3,696,000 in earnings, increased employment for 317 people and a $35,000 increase in personal property taxes. Long term annual increases would be $6,886,000 in earnings, 654 new jobs and $211,000 in property taxes. These increases would be moderately significant overall.

Implementation costs of this alternative would be $31,655,800.

ALTERNATIVE D: ENHANCED WATERSHED VALUE AND WILDLIFE HABITAT

Sediment and water yields would decrease by 58 and 50 percent, respectively, which would improve water quality significantly. Consumptive use of water by livestock would decrease by 485 acre-feet/year. Improvements in watershed condition would be due mainly to deferment of grazing for 2 months in the spring and mechanical treatments of clubmoss-blue grama dominated soils.

The proposed land treatments would improve ecological range condition but the resultant increase in vegetation would not be allocated to livestock. Forage allocations to livestock would decrease by 95,132 AUMs initially but would increase in the long term to 274,983 AUMs, or 44,082 AUMs less than the present allocations of 319,065 AUMs. Production of red meat would decrease by 3,085,740 pounds from the present level of 22,334,550 pounds in the long term.

Deer and antelope are projected to increase threefold. More residual vegetation would result from a July 1 deferment as well as other rest or deferment treatments on AMPs. These would increase upland game birds and nongame wildlife. Increased vegetation from grazing and mechanical treatments might reduce prairie dog habitat. Duck and goose populations would significantly increase by 454 and 43 percent, respectively. Fisheries would increase by 63 percent.

Streambank habitat would reach satisfactory condition on 4,509 acres along an additional 128 miles of streams, and riparian vegetation would increase in 1,933 acres of saline seeps below reservoirs.

Recreational opportunities on public lands would increase because of larger populations of big game and waterfowl. Fishing opportunities would increase with the addition of 17 fisheries reservoirs. ORV access and use on public lands would be hindered by construction of 400 miles of livestock management fences and mechanical treatments of 225,000 acres. Sport shooting of prairie dogs would continue since control of present populations is proposed. No significant impact would occur to wilderness suitability. Visual resource impairment might result from the surface disturbances of mechanical treatments. Positive scenic values would result from increased vegetation in fenced saline seeps, reservoirs, and streambank riparian zones.

Range developments would be located to avoid cultural sites which would otherwise be disturbed.

This alternative would result in a short term annual decrease in ranch income of $1,438,000 on 404 operations. Long term annual decreases would be $717,000 on 318 operations and long term annual increases $44,000 on 86 ranches. Permit value would decrease by $9,467,000 in the short term and $4,512,000 in the long term. Ranch related employment opportunities would decrease by 44 positions in the short term and 21 positions in the long term.

The social well-being of 539 ranch families would decrease in the short term while the social well-being of 115 families would increase and 424 would decrease in the long term. These decreases would be highly significant.

This alternative would increase sales in local businesses engaged in recreation and wildlife related retailing and services in Phillips, Blaine, Hill and Valley Counties, increasing earnings by $74,000 and employment by 7 people. These increases would be insignificant.

The attitudes of ranchers toward BLM would be negative due to decreased forage allocations to livestock and implementation of AMPs. The attitudes of recreationists and environmentalists would be positive due to increased wildlife and reduction in livestock conflicts.

Long term regional economic impacts from this alternative would be insignificant even though earnings would decrease by $589,000 annually, employment by 78 positions and personal property taxes by $38,000 annually.

Implementation costs of this alternative would be $17,774,900.

ALTERNATIVE E: NO GRAZING

The net affect of the elimination of livestock grazing on public lands would be a 25 percent decrease in sediment yield and a 9 percent decrease in water yield in the long term. Additionally, water quality would improve significantly because of reduced levels of fecal bacteria, suspended sediments and nutrients contained in runoff water. Consumption of water by livestock would decrease from 3,523 acre-feet/year to zero.

Public lands in good and excellent ecological range condition would increase 16 percent by 2003 while range in poor and fair ecological range condition would decrease by 26 percent. The improvement of ecological range condition on some areas would result in a net production increase of 12,488 AUMs for allocating to consumptive use other than livestock and nonconsumptive uses. Noxious weeds and prairie dogs would spread. The condition of riparian, shoreline and saline seep vegetation would improve over the entire EIS area. Improvement in range condition would be of low significance, a net 10.9 percent of public land acreage.

Livestock production would decrease by 22,334,550 pounds annually and additional livestock use on private lands would increase and result in reduced productivity.

Eliminating livestock from public lands would not necessarily improve habitat for many of the wildlife species where these had adapted to lower ecological range conditions. These species would experience a reduction in habitat as ecological range condition improved. The additional forage and cover available would be more than that necessary to satisfy the needs of increased wildlife populations. Big game forage could be reduced as plant communities changed from shrubs to grass. High value riparian habitat would increase 221 percent (from 1,406 acres to 4,509 acres). Duck production would increase by 288 percent while goose production would remain static since no additional goose nesting islands would be built. Fisheries reservoirs would decline by 3 because of natural sedimentation. Expansion of prairie dogs to a potential 239,000 acres would reduce game and nongame habitat of competing species not associated with prairie dog towns.



Pelican

Recreational hunting opportunities would significantly increase with substantial increases in big game populations. The number of reservoir fisheries would decline slightly in the long term but quality would increase with the elimination of livestock conflicts. Construction of 5,000 miles of fence would restrict ORV access. Prairie dog sport shooting opportunities would increase significantly.

Wilderness and visual resource values would improve with the elimination of livestock and the resulting increase in vegetation.

There would be no anticipated disturbance of cultural resource sites.

Implementation of this alternative would result in a total income loss of $12,311,000 annually on the 558 ranch operations involved. Grazing permit valuations would decrease by $31,258,000. There would be a loss of 117 ranch related employment opportunities. The social well-being of 744 ranch families would decline. These decreases would be highly significant.

This alternative would increase sales of local businesses engaged in recreation and wildlife related retailing and services in Phillips, Blaine, Hill and Valley Counties, increasing earnings by $73,000 and employment by 7 people. These decreases would be insignificant.

Ranchers' attitudes and perceptions of BLM would be very negative because of the elimination of grazing on public lands in the EIS area. Attitudes of environmentalists and recreationists would be mixed as removal of livestock grazing would improve the naturalness but the reactions of ranchers to their loss of grazing might be reduced access to public lands.

Regional economic impacts would be moderately significant due to losses in annual earnings of $5,516,000 in the short term and $6,543,000 in the long term. Employment opportunities would decrease by 570 in the short term and 669 in the long term and personal property taxes would decrease $239,000 annually through the short and long term.

Total implementation of this alternative would cost about $15,126,500, primarily due to construction of 5,000 miles of exclosure fences around public lands.





Great Blue Heron

ALTERNATIVE F: NO ACTION

Watershed condition would deteriorate with an increase in sediment and water yields. Sediment yield would increase by 753 acre-feet/year and water yield by 29,080 acre-feet/year while the quality of surface water would deteriorate in the long term. Consumptive uses of water livestock would remain at 3,523 acre-feet/year.

Public lands in good and excellent ecological range condition would decrease by 12 percent and the acreage of fair and poor range would increase by 20 percent. Riparian, shoreline and saline seep vegetation would decline or remain static on 6,611 acres. Vegetation allocations to livestock would stay at 319,065 AUMs in the short and long terms. Production of red meat would decrease by 3,066,840 pounds annually.

Wildlife habitat for big game, upland game birds, waterfowl and nongame species (except prairie dogs) would remain unchanged. Prairie dog habitat could increase to 239,000 acres. Reservoir fisheries would decrease to 12, as none of the present 27 reservoirs would be fenced. Streambank habitat condition of 6 miles of high value riparian habitat would decline from satisfactory to unsatisfactory habitat condition. There would be no increase in riparian vegetation in saline seeps below reservoirs.

Recreational opportunities on public lands would remain unchanged for big game and waterfowl hunting. The number of fisheries reservoirs would decrease to 12, thereby significantly reducing fishing opportunities. ORV use on public lands would remain unchanged. The opportunity for sport shooting of prairie dogs would increase significantly with the expansion of prairie dog towns to their biological potential of 239,000 acres. There would be no impact to wilderness in this alternative. Maintenance of current range improvements would be allowed in the Bittercreek WSA. There would be no significant impairment to visual resources.

No disturbance of cultural sites would occur since there would be no development of range facilities.

This alternative would not affect "on paper" short term ranch income, ranch employment opportunities, permit value or the social well-being of ranch families. While there would appear to be no long term effects or changes on paper from the present situation, declining range conditions would continually decrease the livestock forage base, eventually lowering livestock production factors as discussed earlier.

There would be no additional implementation costs for this alternative.

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management The Preferred Alternative		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife Habitat		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Watershed*													
Sediment Yield	4,663	4,678	1,941	4,676	3,459	4,676	1,502	4,691	1,980	5,351	4,009	4,679	5,432
Water Yield	188,454	189,032	93,123	188,958	145,422	188,942	92,731	189,545	95,665	210,875	191,237	188,928	218,008
Water Quality	+	0	+	0	+	0	+	0	+	0	+	0	-
Water Consumption	3,523	3,523	4,392	3,523	4,051	4,130	6,827	2,383	3,037	3,523	0	3,523	3,523

* All figures are acre-feet/year
+ Indicates increased quality
- Indicates decreased quality
0 Indicates no change

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Vegetation													
Ecological Range Condition [1,2]													
Acres Excellent	14,832	Increasing	371,978	Increasing	218,942	Increasing	851,228	Increasing	329,978	Increasing	385,133	Static	14,832
Acres Good	1,035,208	Increasing	1,041,890	Increasing	1,102,348	Decreasing	657,640	Increasing	1,083,890	Decreasing	827,861	Decreasing	907,128
Acres Fair	623,022	Decreasing	265,888	Decreasing	355,574	Decreasing	170,888	Decreasing	265,888	Decreasing	218,523	Decreasing	509,022
Acres Poor	6,803	Decreasing	109	Decreasing	3,001	Decreasing	109	Decreasing	109	Increasing	248,348	Increasing	248,883
Acres Unclassified	69,373	Static	69,373	Static	69,373	Static	69,373	Static	69,373	Static	69,373	Static	69,373
Riparian Vegetation													
High value streamside zones, seeps and around fisheries reservoirs													
Acres Condition Improving			1,324		794				6,611				
Acres Condition Declining					133								6,611
Acres Condition Static or slightly Improving			5,287		2,206		6,611				6,611		
Acres Condition Static or slightly Declining	6,611				3,478								
Vegetation Production (expressed in AUMs)													
Livestock and Wildlife Consumptive Use	339,603	339,603	423,455	339,603	390,604	394,602	638,753	244,471	336,597	20,538	61,614	339,603	339,603
Watershed, Wildlife and Recreation Non-consumptive Use	339,603	339,603	423,455	339,603	390,604	394,602	657,779	434,735	491,281	658,660	630,080	339,603	339,603

1. Changes in condition will occur quite rapidly on some soils when treated, however, as these changes are dependent upon which areas are treated and when during the short term no reliable estimates are possible for expected changes during the short term.

2. Total acreage figures include acres of predicted prairie dog towns, noxious weeds and riparian vegetation.

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Livestock													
Red Meat Production (live weight)	22,334,550												
Pounds Increase	X	Increasing	5,505,885	Increasing	3,344,670	3,849,930	20,940,465						
Pounds Decrease	X							6,659,258	3,085,740	22,334,550			3,066,840
Permitted Livestock (numbers or extension of grazing season		Significant Increase		Moderate Increase		Highly Significant Increase		Moderate Decrease		Highly Significant Decrease		No Change	

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Wildlife													
Big Game													
Deer (No.)	8,000	8,000	16,000	8,000	12,000	8,000	12,000	8,000	24,000	8,000	24,000	8,000	8,000
Antelope (No.)	4,750	4,750	9,500	4,750	7,125	4,750	7,125	4,750	14,250	4,750	14,250	4,750	4,750
Forage (AUM)	20,538	20,538	25,734	20,538	23,758	20,538	20,538	20,538	61,614	20,538	319,557	20,538	20,538
Habitat (Acres)	Static	Static	Improve 1,621,741	Static	Improve 1,013,995	Static	Improve 1,621,741	Static	Improve 1,621,741	Static	Improve 1,749,239	Static	Static
Upland Game Birds													
Habitat (Acres)	Static	Static	Improve 1,621,741	Static	Improve 1,013,995	Static	Improve 1,621,741	Static	Improve 1,621,741	Static	Improve 1,749,239	Static	Static
Waterfowl													
Ducks (No.)	34,800	34,800	74,600	34,800	42,400	34,800	74,600	34,800	158,000	34,800	134,900	34,800	34,800
Canada Geese (No.)	5,500	5,500	7,850	5,500	6,560	5,500	7,850	5,500	7,850	5,500	5,500	5,500	5,500
Habitat (Acres)	Static	Static	Improve 1,621,741	Static	Improve 1,013,995	Static	Improve 1.721,841	Static	Improve 1,621,741	Static	Improve 1.749,239	Static	Static
Nongame													
Habitat (Acres)	Static	Static	Improve 1,621,740	Static	Improve 1.013,995	Static	Improve 1,621,740	Static	Improve 1,621,740	Static	Improve 1,749,239	Static	Static
Prairie Dogs (Acres)	1,715	1,715	615	1,715	615	1,715	0	1,715	1,715	1,715	239,000	1,715	239,000
Existing Shoreline Vegetation	1,640	1,640	Improve 1,640	1,640	Improve 1,640	1,640	Improve 1,640	1,640	Improve 1,640	1,640	Improve 1,640	1,640	1,640
New Shoreline Vegetation	0	0	243	0	110	0	243	0	243	0	0	0	0
Fisheries													
Reservoirs (No.)	27	27	39	27	26	27	32	27	44	27	24	27	12
Fencing (Acres)	0	0	70	0	36	0	0	0	169	0	0	0	0
High Value Streamside Riparian Vegetation													
Miles Satisfactory (Acres)	58 (1,406)	58 (1,406)	91 (2,206)	58 (1,406)	74 (1,794)	58 (1,406)	63 (1,527)	58 (1,406)	186 (4,509)	58 (1,406)	186 (4,509)	58 (1,406)	52 (1,261)
Miles Unsatisfactory (Acres)	128 (3,103)	128 (3,103)	95 (2,303)	112 (2,715)	112 (2,715)	128 (3,103)	123 (2,982)	128 (3,103)	0	128 (3,103)	0	128 (3,103)	134 (3,248)
Riparian Vegetation Associated with Saline Seeps (Acres)	0	0	575	0	370	0	0	0	1,933	0	1,933	0	0

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Recreation													
	Populations												
Game Hunting	Deer 8,000 Antelope 4,750 Ducks 34,800 Canada Geese 5,500	None	Highly significant increase 100% big game 114% ducks 43% geese	None	Highly significant increase 100% big game (on affected allotments) 22% ducks 19% geese	None	Moderately significant increase 50% big game 114% ducks 43% geese Moderately significant increase in hunting conflicts	None	Highly significant increase 200% big game 354% ducks 43% geese	None	Highly significant increase 200% big game 288% ducks Highly significant decrease in livestock conflicts	None	None
Fishing	27 Fishing Reservoirs None Fenced	None	Significant 44% increase in reservoir fisheries Significant 40% decrease in livestock conflicts by fencing reservoirs	None	Insignificant 4% decrease in reservoir fisheries Moderately significant 25% decrease in livestock conflicts from fencing	None	Moderately significant 19% increase in reservoir fisheries Moderately significant increase in livestock conflicts	None	Highly significant 63% increase in reservoir fisheries Highly significant 100% decrease in livestock conflicts from fencing	None	Moderately significant 11% decrease in reservoir fisheries 100% decrease in livestock conflicts by removal of livestock	None	Highly significant 56% decrease in reservoir fisheries
ORV Travel	Open Limited only by an estimated 5,000 miles of management fencing	None	Moderately significant decrease in cross country access	None	Moderately significant decrease in cross country access	None	Highly significant decrease in cross country access	None	Moderately significant decrease in cross country access	Significantly decreased access	Significantly decreased access	None	None
Prairie Dog Hunting	1,715 acres of prairie dog towns	None	Significant reduction of 1,100 acres	None	Significant reduction of 1,100 acres	None	Highly significant elimination of 1,715 acres	None	No impact	None	Highly significant increase of up to 237,300 acres	None	Highly significant increase of up to 237,300 acres
Wilderness	One WSA designated interim management policy guidelines followed for any proposed action	None	None	None	None	None	None	None	None	Highly significant increase in naturalness and solitude	Same as short term	None	None
VRM	Class I - 1,750 acres Class II - 210,000 Class III - 56,000 Class IV - 1,482,250	None	None	None	None	None	Moderately significant reduction in scenic quality	None	None	Moderately significant increase in naturalness and vegetation	Same as short term	None	None

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Cultural Resources													
Potential Sites (est.)	17,492												
Potential Sites (Disturbed)		285		179		924		229		0	0	0	0

Summary of Environmental Consequences by Alternative

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife Habitat		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Social-Economic													
Economic & Social Impact on Ranches													
Number Ranches	558												
Number Families	744												
Ranch Income	$8,576,322												
No. Ranches with Income Increase		0	395	0	179	293	379	0	86	0	0	0	0
Total Dollar Increase		0	$ 495,000	0	$ 296,000	$ 400,000	$ 1,974,000	0	$ 44,000	0	0	0	0
No. Ranches with Income Decrease		0	0	0	0	95	17	404	318	558	558	0	0
Total Dollar Decrease		0	0	0	0	$ 142,000	$ 38,000	$ 1,438,000	$ 717,000	$ 12,311,000	$ 12,311,000	0	0
Permit Values	$31,258,000	0	$+7,804,000	0	$+4,635,000	$+5,267,000	$+30,831,000	$-9,467,000	$-4,512,000	$-31,258,000	$-31,258,000	0	0
Ranch Employment	175	0	+ 32	0	+ 22	+ 22	+127	- 44	- 21	-117	-117	0	0
No. Ranch Families with Increase in Social Well-being		0	527	0	239	391	505	0	115	0	0	0	0
Total Impact of Increases		None	Moderately Significant	None	Moderately Significant	Moderately Significant	Highly Significant	None	Moderately Significant	None	None	None	None
No. Ranch Families with Decrease in Social Well-being		0	0	0	0	127	23	539	424	744	744	0	0
Total Impact of Decreases		None	None	None	None	Moderately Significant	Moderately Significant	Highly Significant	Highly Significant	Highly Significant	Highly Significant	None	None
Recreation/Wildlife Related Economic Impacts													
ISA Earnings	$200,013,000	0	$ +37,000	0	$ +22,000	0	$ +19,000	0	$ +74,000	$ +70,000	$ +73,000	0	0
ISA Employment	19,520	0	+ 4	0	+ 2	0	+ 2	0	+ 7	+ 7	+ 7	0	0
Total Impact to ISA Economy		None	Insig.	None	Insig.	None	Insig.	None	Insig.	Insig.	Insig.	None	None
Impact on Attitudes													
Ranchers-Forage Allocation[1]		+	+	+	+	+	+	-	-	-	-	NC	-
Ranchers AMPs[2]		±	±	±	±	+	+	-	-	None	None	None	None
Environmentalists/ Recreationists - Forage Allocation[3]		+	+	±	±	-	-	+	+	±	±	-	-

Summary of Environmental Consequences by Alternative Continued

Environmental Component	Existing Situation	Alternative A Enhanced Combined Vegetation Uses		Alternative B Continuation of Present Management		Alternative C Enhanced Livestock Forage		Alternative D Enhanced Watershed Value and Wildlife Habitat		Alternative E No Grazing		Alternative F No Action	
		Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term	Short Term	Long Term
Regional Economic Impacts													
ISA Earnings	$200,013,000	$+1,385,000	$+2,087,000	$+747,000	$+ 999,000	$+3,696,000	$+6,886,000	$ -666,000	$ -589,000	$-5,516,000	$-6,543,000	0	0
ISA Employment	19,520	+107	+186	+ 60	+ 91	+317	+654	- 96	- 78	-570	-669	0	0
ISA Personal Property Taxes	$ 553,000	0	$ +54,000	0	$ +27,000	$ +35,000	$ +211,000	$ -77,000	$ -38,000	$ -239,000	$ -239,000	0	0
Total Impact to ISA Economy		Insig.	Insig.	Insig.	Insig.	Moderately Significant	Moderately Significant	Insig.	Insig.	Moderately Significant	Moderately Significant	None	None
Total Implementation Cost		$14,356,300		$ 8,401,500		$31,655,800		$17,774,900		$15,126,500		None	None

1. Want to see increase in forage allocated for livestock.
2. Want to see minimal government presence and control and enhancement of range for livestock.
3. Want to see increase in forage allocated for wildlife and watershed.

\+ Positive attitude.

\- Negative attitude.

NC No Change

CHAPTER 3

THE AFFECTED ENVIRONMENT

THE AFFECTED ENVIRONMENT

CLIMATE and AIR QUALITY

The dry continental climate of the Prairie Potholes EIS area is characterized by short summers with cool to mild temperatures,and long cold winters with periods of extremely cold weather. Surface air temperatures in the western part of the area average 65 degrees Fahrenheit (°F) in July and 17°F in January. The surface air are lower in the eastern part of the area, averaging 70°F and 9°F in July and January, respectively. Temperatures fluctuate greatly during all seasons of the year, limiting the growing season to between 116-151 days (Map 6, *Map Supplement*).

Prevailing wind direction in the western portion of the EIS area is from the southwest while in the eastern portion of the area winds are from the southeast (NOAA, 1981). Yearly wind speed averages 10 miles per hour with higher speed winds accompanying local thunderstorms and frontal weather systems. Wind speeds in excess of 50 mph occur frequently during the winter months. Winds associated with frontal weather systems in winter are known locally as "chinooks". Chinooks raise temperatures dramatically (often as much as 50°F in a few hours) melting and evaporating ice and snow. Since the ground usually remains frozen, however, little of this moisture penetrates the soil. Chinooks are most common in the EIS area west of Malta.

Precipitation levels also fluctuate, averaging 11.5 inches in the western part of the area and 14.5 inches in the eastern. The Prairie Potholes EIS area receives the greatest concentration of precipitation during April-June as rain. Periodic chinooks melt much of the annual average of 34 inches of snow.

Air quality in the EIS area is good principally because there are few industries and homes in the area. According to an air quality monitoring station near Scobey, Montana, particulate concentration is lowest during the winter. The highest concentration comes in the spring and summer during peak agricultural activities (Hesla, Robbins, Gelhaus and Roach, 1979).

GEOLOGY

The geologic formations of the Prairie Potholes EIS area are largely sedimentary, horizontal strata. In the Bears Paw Mountains and Sweet Grass Hills, however, these sedimentary strata are sharply tilted by intrusive igneous rocks forming dome-type mountains (Figure 3.1; Table 3.1). Most of the bedrock in the area has a mosaic mantle of glacial moraine and outwash material consisting of silt, clay, sand and gravel.

The name "Prairie Potholes" comes from the pock-marking of the landscape by glaciers during the last Ice Age 10,000 years ago (Perry, 1962; Figure 3.2). Large blocks of ice covered with glacial drift were left by retreating glaciers. When the blocks melted, small, shallow bowl-shaped depressions were created. These small depressions, often filled with water, are called potholes. There are more than 3,000 of these on public lands in the EIS area.

WATERSHED

SOILS

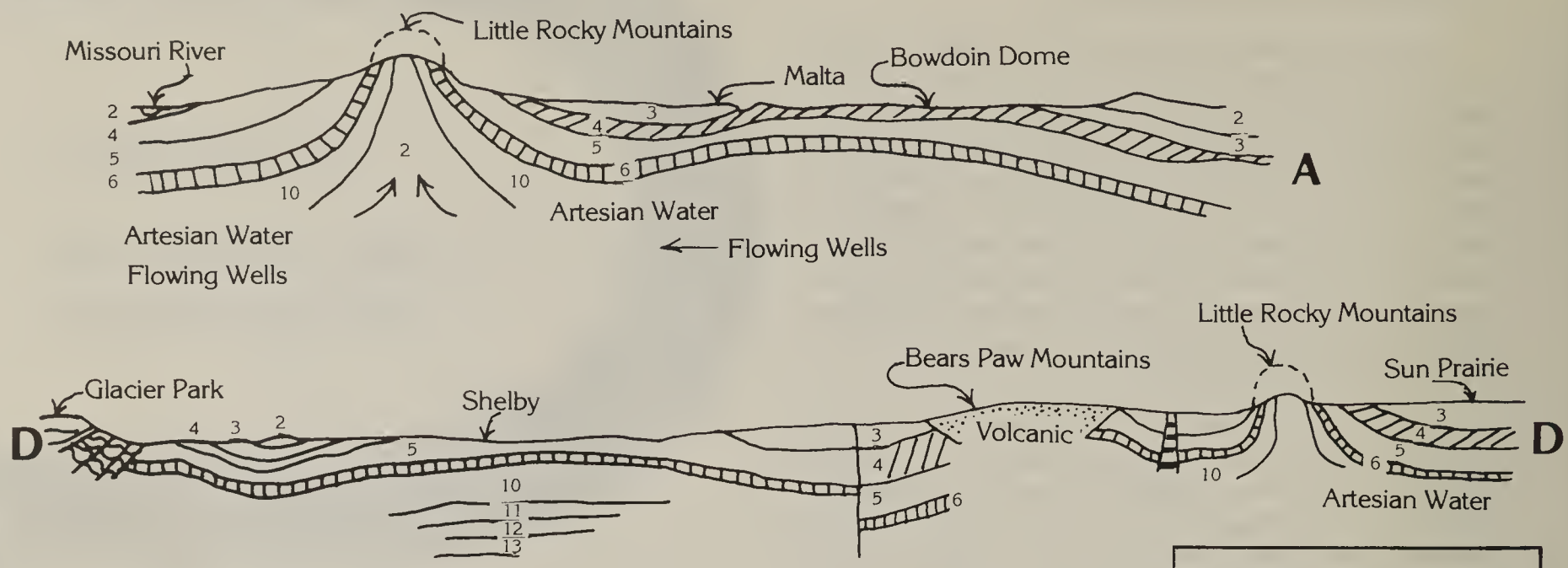
The soils of the EIS area are derived mainly from glacial till, sedimentary bedrock and alluvium from mixed rock sources. Because of this the area has complex and diverse soil patterns, varying greatly in character and productivity. The physical properties of the soil series are shown in Appendix 3.1.

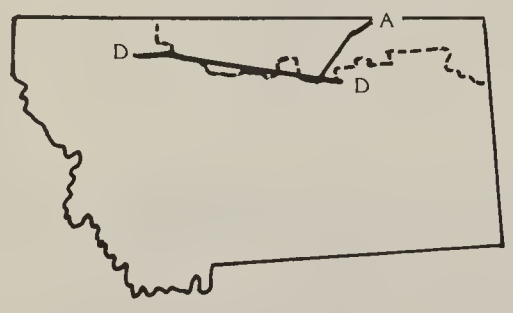
For descriptive purposes in this EIS, the soils were grouped into 19 geomorphic soil subgroups (Map 3, *Map Supplement* and Appendix 3.2). Each of these soil subgroups have unique capabilities and limitations for land uses and treatments based upon climate, parent material, topography and soil properties. The vegetation characteristics of the geomorphic soil subgroups are also given in Appendix 3.2.

About 55 percent (955,000 acres) of public lands in the EIS area have moderate to high potential for water erosion. Allotments in areas dominated by soil subgroups 2, 3, 4, 5, 6, 10, 11, 13, 16 and 17 (see Map 3 and the Allotment Overlay) have a moderate to high water erosion hazard because of infiltration, permeability, texture, structure and slope. Allotments in areas dominated by subgroups 1, 7, 8, 9, 12, 14, 15, 18 and 19 have mainly slight to moderate water erosion hazards. Estimates of soil erosion condition based upon the SVIM inventory (BLM, 1978) were not available for this EIS. The information will be used, however, along with continuing erosion condition monitoring studies for the development of AMPs.

Based on step-point transects, vegetation cover on all 19 soil subgroups on public lands in the EIS area range from 24-100 percent under current vegetation allocations (Table 3.2), which are sometimes less than the minimum necessary for maintaining soil stability and

FIGURE 3.1 GENERALIZED GEOLOGICAL CROSS-SECTION OF MONTANA





Source: Generalized Geologic Cross-section of Montana, Eugene S. Perry 1931, Montana Bureau of Mines and Geology, Memoir 2.

LIST OF FORMATIONS

1. Fort Union formation
2. Lance formation
3. Bearpaw formation
4. Montana group
5. Colorado group
6. Kootenai formation
7. Ellis & Morrison formation
8. Chugwater formation
9. Quadrant formation
10. Madison formation
11. Devonian formation
12. Cambrian formation
13. Pre-Cambrian formation

productivity. Desired soil vegetation cover percentages (called "Target Soil Vegetation Cover") have been developed for each soil subgroup. The vegetation cover targets for soil subgroups 3, 4, 13 and 16 (a total of 442,857 acres of public lands) are low but reflect the maximum cover potential for these fragile soils. The vegetation cover targets for subgroups 1, 2, 5, 9, 11, 12, 14 and 18 (1,181,206 acres) are high because these soils tend to have an understory cover of clubmoss, blue grama and other plants.

Soils in subgroups 3, 4, 6, 7, 16 and 17 comprising 451,150 acres of public lands are unsuited for season long grazing because of the severe erosion potential of soils on shale uplands and along stream channels. These soils are most suited to rest rotation grazing systems due to the fragile nature of the soils, susceptibility to trampling and soil compaction during seasonally wet periods and the clayey textures in shale areas. (See Appendix 3.1 for erosion and compaction ratings.) Soils in these subgroups are also well suited to deferred and deferred rotation grazing systems. Because of the topography, slope, erosion potential due to flood waters or texture of soils, mechanical treatments are not recommended.

Soils in subgroups 1, 2, 5, 8, 9, 10, 11 and 18, a total of 1,207,334 acres of public lands, are well suited to all of the grazing systems listed in Chapter 1. Mechanical treatments would increase production two-four times on these soils by changing vegetation compostion, improving infiltration, reducing runoff and catching more snow.

The 91,713 acres of public lands in soil subgroups 12, 13, 14, 15 and 19 are well suited to deferred, deferred rotation and rest rotation grazing systems. The subgroups are least suited to a season long grazing system because vegetation cover and litter on these soils are critical for stable watershed conditions and maximum vegetation production. Soil subgroups 15 and 19 (4,900 acres of public lands) occur in mountainous areas where spring season of use by livestock should be delayed until the snow melts and the cool season plants have adequate growth. This ensures plant vigor and provides ground cover. Grazing systems with late spring season of use would stabilize watershed conditions and maintain water quality in these areas.

Riparian soils (located in subgroups 6 and 17 which total 50,920 acres of public lands) are usually saturated with water in the spring and transmit all inflow water except that lost to evaporation and used by growing plants. The slow release of water from riparian zones prolongs streamflow periods for offsite or downstream users. Riparian zones are also sources for recharge of subterranean aquifers.

TABLE 3.1: GROUNDWATER SOURCES BASED ON GEOLOGY IN THE EIS AREA[1]

System	Series	Formation	Approx. max. thickness (feet)	Lithologic character	Water supply
Quaternary	Recent	Alluvium, lake, and pond deposits	200	Unconsolidated gravel, sand, silt, and clay. Alluvium underlies stream valleys. Sediments floor numerous undrained depressions.	Alluvium in Milk River valley locally yields moderate supplies of highly mineralized water. Alluvium is tributary valleys is variable in its water-bearing characteristics but locally provides moderate supplies of water of fair quality. Deposits are too thin and fine-grained to be a source of groundwater.
	Pleistocene	Glacial deposits (Kames, eskers, ice-contact deposits, and outwash deposits)	100	Unsorted clay, silt, sand, gravel, and boulders (glacial till) and stratified deposits of sand and gravel.	Wells in glacial till yield little water. Saturated stratified deposits may yield moderate supplies.
Tertiary	Miocene or Pliocene	Flaxville formation	75	Well-rounded, moderately well sorted, generally unconsolidated beds of sand and quartzite and argillite pebbles and cobbles.	Yields moderate to large amounts of water of good quality.
Cretaceous	Upper Cretaceous	Hell Creek formation	200	Interbedded tan and gray sandstone and shale with a few thin lignite beds. Numerous brown concretions in places.	Yields small to moderate amounts of water of fair quality, where topography not greatly dissected.
		Montana Group: Fox Hills sandstone	100	Fine-grained, friable, gray sandstone containing a few marine fossils.	Good in upper part where no greatly dissected.
		Montana Group: Bearpaw shale	1,000	Dark bluish-gray to brown, marine shale containing numerous concretions and thin beds of white or gray bentonite.	Essentially non-water-bearing.
		Montana Group: Judith River formation	400	Light-colored continental and brackish-water deposits of lenticular sandstone, shale, and clay, with some lignite.	Yields small to moderate amounts of water. Water rather highly mineralized but may be used for stock and domestic purposes.

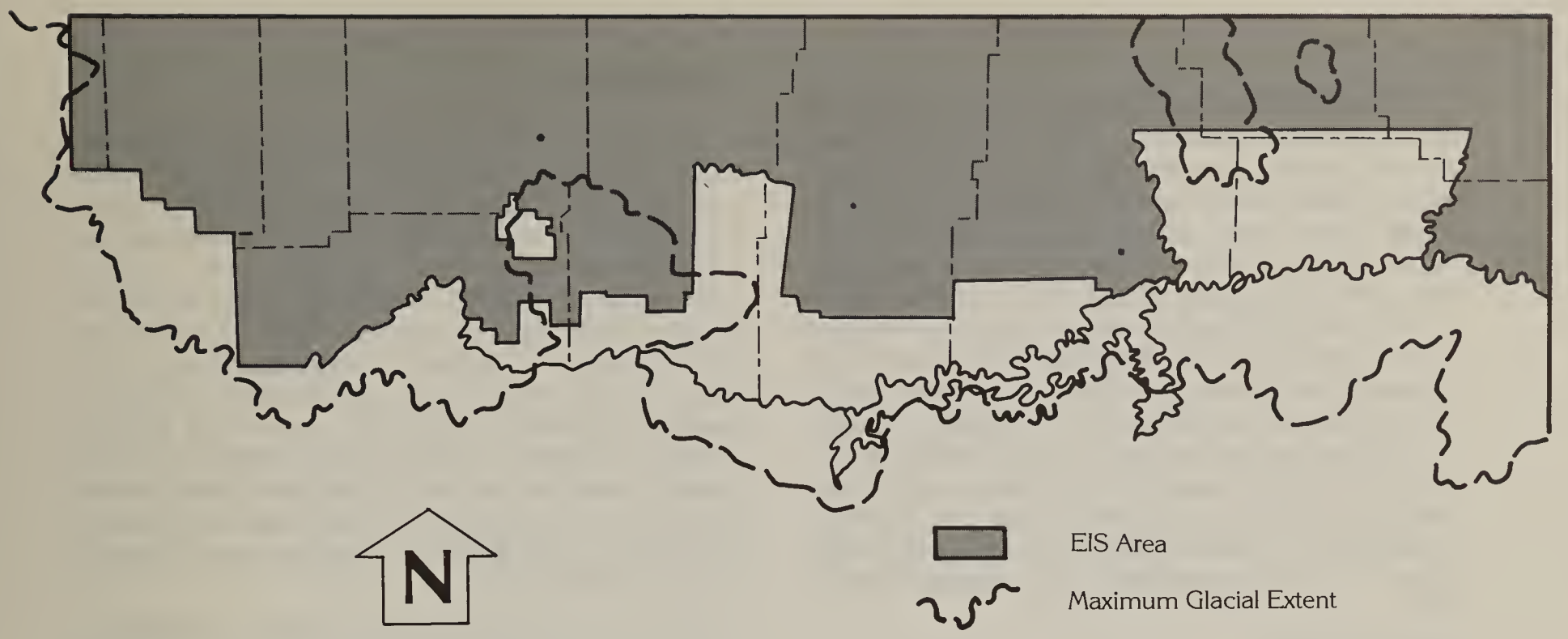
1. Everett A. Zimmerman, Preliminary Report on the Geology and Groundwater Resources of Northern Blaine County, Montana (Butte, Montana: Bureau of Mines and Geology, 1960) pp. 153.

TABLE 3.2: TARGET SOIL VEGETATION COVER
BY SOIL SUBGROUP

Soil Subgroup and Soil Names	Target Soil Vegetation Cover (%)	Range in Existing Cover (%)	Public Land Acreage and % of the Total
1. Loamy glacial till upland plains; series are Bearpaw, Dooley, Hillon, Joplin, Kevin, Phillips, Scobey, Sunburst, Telstad, Vida, Williams, Zahl, Zahill	80	24-100	687,332 (39.3%)
2. Claypan and dense clay glacial till uplands; series are Elloam, Tealette, Theony	85	30-98	357,191 (20.4%)
3. Clayey acid shale uplands; series are Dilts, Julin, Teigen	55	36-72	215,463 (12.3%)
4. Calcareous or bentonitic shale uplands; series are Abor, Bascovy, Dimyaw, Lisam, Norbert, Neldore, Thebo, Weingart, Yawdim	55	32-95	173,169 (9.9%)
5. Loamy sedimentary uplands; series are Cabba, Cabbart, Cambert, Dast, Delpoint, Doney, Ernem, Lonna, Marmarth, Reeder, Rentsac, Riedel, Twilight	80	71-99	42,441 (2.4%)
6. Loamy and clayey floodplains; series are Bowdoin, Gesa, Glendive, Hanly, Harlem, Havre, Havrelon, Kiwanis, Korchea, Korent, Lallie, Lardell, Lohler, Nesda, Rivra, Trembles, Typic Fluvaquents, Typic Ustifluvents, Aquic Ustifluvents, Fluvaquentic Haploboralls, Ustic Torrifluvents	90	58-99	50,920 (2.9%)
7. Potholes and level basins subject to ponding; series are Dimmick, McKenzie, Nishon	90	81-100	11,598 (0.7%)
8. Moderately coarse and coarse textured soils on terraces, footslopes and fans; series are Assinniboine, Blanchard, Busby, Chinook, Cozberg, Hawksell, Lihen, Parshall, Tally, Yetull	75	74-99	10,489 (0.7%)
9. Medium textured soils on terraces, footslopes and fans; series are Attewan, Benz, Bitton, Brockway, Evanston, Farland, Farnuf, Floweree, Judith, Kremlin, Lambeth, Macar, Martinsdale, Redvale, Shawmut, Straw, Turner, Vanstel, Work, Yamac	80	63-99	33,805 (1.9%)
10. Fine textured soils on terraces, footslopes and fans; series are Acel, Cherry, Ethridge, Grail, Kobar, Lawther, Linnet, Lothair, Marias, Marvan, Pendroy, Richey, Savage, Shaak	70	61-99	47,278 (2.7%)
11. Claypan and dense clay soils on terraces, footslopes and fans; series are Creed, Gerdrum, Tealette	85	49-93	25,240 (1.4%)
12. Subirrigated and saline claypans on terraces and fans; series are Absher, Adger, Nobe	85	63-88	27,952 (1.6%)
13. Very slowly permeable soils of terraces and fans, series are Vanda, Vaeda	50	48-73	54,225 (3.1%)
14. Very gravelly, extremely gravelly and cobbly soils on terraces and fans; series are Beaverell, Beaverton, Tinsley, Wabek, Windham	85	39-97	4,636 (0.3%)
15. Loamy and clayey soils in mountains with forest canopy; series are Arcette, Belain, Cowood, Elve, Gambler, Lolo, Macmeal, Repp, Sicklesteets, Silverchief, Trapper, Warneke, Whitecow, Whitore	85	75	1,351 (0.1%)
16. Clay shale uplands with forest canopy cover; series are Bascovy, Dilts, Julin, Neldore	55	32-72	Trace
17. Loamy and clayey floodplains with more than 10% canopy cover of deciduous trees; soils are the same as subgroup 6	90	58-99	Trace
18. Loamy and clayey soils on fans and footslopes of mountains and foothills; series are Belain, Hedoes, Lolo	80	41-97	2,609 (0.1%)
19. Loamy and loamy-skeletal soils on bedrock ridges and on footslopes of mountains; series are Castner, Cheadle, Libeg, Perma, Warneke	85	33-100	3,549 (0.2%)
Total			1,749,238 (100%)

Source: BLM, 1980.

FIGURE 3.2 MAXIMUM GLACIAL EXTENT



Source : Quaternary Geology of Northern Great Plains
R.W. Lemke, W.M. Laird, M.J. Tipton, R.M. Lindvall

Since riparian zones are highly productive forage sites, livestock use these areas intensively. Riparian vegetation provides rubbing and shade sources to cattle in addition to forage and easy access to water. Erosion, with attendant stream channelization and sedimentation, has developed as a result of livestock concentrations in these zones. Riparian soils are best suited to rest rotation grazing and deferred rotation grazing systems.

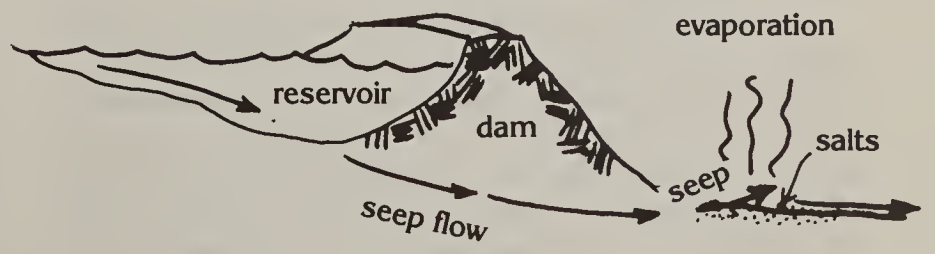
Mechanically treated sites in the EIS area have responded rapidly with up to fourfold increases in vegetation production with sediment and water yields reduced to near zero (Ryerson, 1980).

Soil subgroups 1 (with slopes less than 12 percent), 2, 5, 8, 9, 10, 11 and 18 with slopes less than 8 percent are suitable for mechanical treatments. Some soils in other subgroups may be suitable for mechanical treatments after an onsite determination.

The treatment of clubmoss infested pastures continues to be of special concern to watershed resources. While an excellent ground cover, clubmoss limits infiltration,causing runoff from heavy rain storms to create erosion offsite. Mechanical treatments are effective in controlling clubmoss and alleviating channel erosion problems caused by runoff from clubmoss infested sites (Ryerson and Houlton, 1980).

Saline seeps are wet, saline soils in drainages below reservoirs and on some other slopes and drainages. Water impoundment structures often produce areas of seepage below them (Figure 3.3). Water percolates through reservoirs, dams and abutments, dissolving salts from local soils. These salts accumulate at the soil surface by the upward capillary movement of water and its subsequent evaporation. Some saline seep water from the seeps moves down drainages causing changes in vegetation composition and reducing soil productivity, particularly on riparian soils.

FIGURE 3.3 SALINE SEEP BELOW RESERVOIR



Source: Brown & Ferguson, 1976; Bahls and Miller, 1976.

Prime farmlands are those that have an adequate and dependable moisture supply, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content and few or no rocks. They are permeable to both water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time and they either do not flood or are protected from flooding. Unique farmland is land other than prime farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to modern farming methods. There are no prime or unique farmlands on public lands in the EIS area.

Groundwater

The availability of groundwater in the Milk River basin, the major drainage in the Prairie Potholes EIS area, is directly related to the geology of the area. Sandstone aquifers, notably the Judith River formation, contain small to moderate quantities of fair to poor quality water. These aquifers are widely used for domestic and stock water. Bedrock formations, consisting mainly of shales (especially the Bearpaw and Claggett shales) are widespread in the EIS area and yield very small amounts of poor quality water to wells used primarily for livestock watering (Zimmerman, 1960).

Glacial deposits, a mixture of boulders, gravel, sand, silt and clay, yield small quantities of fair quality water to wells. Alluvial deposits along the Milk River and other principle drainageways (also composed of silt, sand and gravel) yield moderate to large amounts of water of varying quality (Bloom and Botz, 1974).

Another source of groundwater, artesian wells, are a result of geologic conditions. Upturned sedimentary beds around domed mountains receive and transmit water through permeable aquifers (Perry, 1931). Wells drilled into the permeable beds produce flowing or artesian wells (Figure 3.1).

At the present time there are 60 wells in the EIS area supplying water for livestock and wildlife consumption. During a six month grazing season about 2.4 acre feet of groundwater are withdrawn for consumptive use by livestock and wildlife.

Much of the EIS area lacks good quality groundwater (Table 3.3 and Appendix 3.3). Good quality water is available from deeply buried aquifers but extraction is often uneconomical. Water for domestic and livestock uses is available but varies in quality. Water in consolidated sedimentary rock tends to be of poorer quality than water in alluvial deposits and surface water.

Surface Water

The Milk River is the major drainage in the EIS area. Rising in Glacier National Park, the Milk River flows northward into Canada and enters the EIS area in Hill County, flowing in an easterly direction until its confluence with the Missouri River downstream from the Fort Peck Reservoir. The Milk River basin contains approximately 15,000 square miles and drains 77 percent of Blaine County, 11 percent of Chouteau County, 17 percent of Glacier County, 91 percent of Hill County, 27 percent of Liberty County, 72 percent of Phillips County, 15 percent of Toole County and 66 percent of Valley County. Within the EIS area, topography in the Milk River basin ranges from 7,000 feet in the Sweet Grass Hills to 2,000 feet in southern Valley County (Bloom and Botz, 1974).

There are 13 perennial and 61 major intermittent streams in the Prairie Potholes EIS area. On public lands there are 14 miles (or 15 percent) of the 927 miles of perennial streams and 340 miles (or 35 percent) of the 967 miles of major intermittent streams (Table 3.4).

Average annual runoff in the Milk River basin is 0.5 inches. The discharge of the Milk River as measured at the confluence of Missouri River averages 500,000 acre feet per year (Bureau of Reclamation, 1972).

A water quality survey was conducted in the EIS area during 1979-80. Surface water quality in the Milk River basin is generally good for domestic, irrigation and livestock consumption (Table 3.5).

In addition to major streams, the EIS area has approximately 2,298 reservoirs and 3,472 natural potholes on public lands. Estimated surface acreage of present reservoirs is 6,900 acres with a storage capacity of 17,000 acre feet. Under current conditions, consumptive use of surface water by livestock is 1,752 acre feet per six month grazing period. Reservoir water quality is generally good but, during drought conditions, evaporation and consumption of water by livestock reduce water levels and concentrate salt, increase fecal coliform bacteria concentrations and turbidity, and raise water temperatures. Some reservoirs have been known to develop algae blooms (which may be toxic) under certain circumstances in late summer.

Natural potholes in the northern portion of the EIS area cover approximately 18,130 acres. Most potholes are shallow and ephemeral; that is, they are filled by melting snow and spring rains and contain water only until water infiltrates, evaporates or is used by plants and animals. Water quality has not been determined for potholes; however, water is of high enough quality to be consumed by wildlife and domestic livestock and to support waterfowl.

TABLE 3.3: GROUNDWATER - WATER QUALITY SURVEY

Well Name	Well Location Twp.	Rg.	Sec.	Calcium ppm*	Magnesium ppm	Sodium ppm	Potassium ppm	Carbonate Alkalinity ppm	Bicarbonate Alkalinity ppm	Total Alkalinity ppm	Total Hardness ppm	Chloride ppm	Sulfate ppm	Nitrate ppm	TDS ppm	Conductivity Field umhos	Conductivity Lab umhos	pH	Temp. °F
VALLEY RA																			
Willow Ck.	26N	39E	29	3.9	1.4	875.0	6.5	0.0	1507.0	1235.0	15.1	320.0	205.0	0.08	1920.0	4500	3000	7.9	48
Dog Creek	26N	38E	25	2.4	0.4	525.0	2.4	62.8	1120.0	918.0	7.8	17.9	97.0	0.08	960.0	4000	1500	8.4	56
Witcher	27N	39E	35	12.6	17.2	280.0	6.1	0.0	650.0	598.0	105.0	3.2	145.0	11.5	940.0	4000	1000	7.4	52
Pitcher	30N	39E	17	50.4	17.9	75.0	5.5	0.0	281.0	230.0	200.0	4.6	105.0	2.2	345.0	700	540	7.1	50
Nelson	36N	41E	10	58.5	23.7	24.0	5.5	0.0	376.0	316.0	250.0	1.8	21.0	0.08	288.0	590	450	6.9	45
Mite	32N	37E	31	38.8	17.6	37.0	5.0	0.0	259.0	212.0	170.0	3.7	43.0	3.3	269.0	590	420	7.0	51
Johnson	29N	39E	1	96.4	44.4	180.0	5.8	0.0	531.0	435.0	434.0	17.9	252.0	0.18	104.0	490	1100	7.0	47
Unknown	26N	39E	30	28.7	13.8	65.0	4.5	0.0	292.0	239.0	128.0	2.8	30.0	3.2	250.0	5000	390	7.2	50
PHILLIPS RA																			
D & L	30N	29E	6	2.6	1.2	700.0	6.3	0.0	1640.0	1753.0	11.7	137.0	18.0	0.08	1480.0	3000	2200	7.9	53
Olson Rotation	29N	30E	13	4.0	5.9	562.0	2.4	0.0	1203.0	986.0	35.1	9.5	244.0	0.35	787.0	2300	1500	7.6	50
Bell Ridge	23N	24E	19	0.8	1.5	687.0	2.4	34.5	1539.0	1261.0	7.8	31.6	84.2	0.08	1088.0	2400	1700	8.4	60
Sitt	29N	28E	12	50.6	7.4	20.0	24.1	0.0	254.0	223.0	160.0	3.2	36.0	5.1	217.0	485	340	7.4	54
HAVRE RA																			
Louie	37N	25E	24	34.0	30.1	67.9	3.5	0.0	244.0	184.0	216.0	14.7	180.0	4.9	397.0	1600	620	7.9	41
Big Flat	35N	25E	33	53.7	48.6	34.1	4.8	0.0	411.0	337.0	345.0	14.7	25.0	15.0	416.0	1000	650	7.2	45

* ppm - parts per million

Source: BLM, 1980.

TABLE 3.4: PERENNIAL AND INTERMITTENT STREAMS IN THE EIS AREA

Stream	Status	Total Miles	BLM Miles	Percent of Stream on Public Land
Havre Resource Area				
30 Mile Creek	I	20	3	15
Cut Bank Creek	P	51	2	4
E. Fork Battle Creek	I	26	9	35
Battle Creek	I	36	3	8
Borders Coulee	I	3.5	3	86
15 Mile Coulee	I	23	3	13
Corregan Coulee	I	11	4.75	42
Link Coulee	I	5	4.5	90
Savoy Coulee	I	15	2	13
Twin Coulee	I	6	4	67
Woody Island Coulee	I	25.5	3.5	14
Chouteau Coulee	I	32	8	25
Reservoir Coulee	I	12	7	58
Irvins Coulee	I	10	5	50
Black Coulee	I	17	8	47
Marias River	P	266	38	16
Total		559	107.75	19
Phillips Resource Area				
Whitewater Creek	P	56	32	57
Cottonwood Creek	P	51	9	18
Garland Coulee	P	11	7	64
Beaver (P.P. Section) Creek	P	171	20	12
Black Coulee	P	12	10	83
N. Whiterock Creek	I	11	8	73
Whiterock Creek	I	16	14	88
Flat Creek	I	27	12	44
Sage Creek	I	15	14	93
Assiniboine Creek	P	42	3	7
Little Cottonwood Creek	I	36	2	6
Wilson Coulee	I	17	3	18
Exeter Creek	I	19	4	21
Martins Coulee	I	15	3	20
White Creek	I	42	5	12
First Creek	I	13	1	8
Second Creek	I	14	2	14
Third Creek	I	11	1	9
Fourth Creek	I	17	1	6
West Alkali Creek	I	27	3	11
Alkali Creek	P	37	3	8
Seven Mile Creek	I	12	1	8
Wild Horse Creek	I	41	1	3
Rudolph Coulee	I	25	4	15
Little Warm Creek	I	44	1	2
Big Warm Creek	I	71	2	3
DHS Creek	I	13	2	15
Dodson Creek	I	34	1	3
Austin Coulee	I	27	2	8
Total		927	171	18
Valley Resource Area				
Rock Creek	P	50	15	33
W. Fork Rock Creek	I	6	.5	8
S. Fork Rock Creek	I	11	6	54
Willow Creek	P	24	11	46
E. Fork Willow Creek	I	18	8	44
Bitter Creek	I	15	13.25	88
S. Fork Bitter Creek	I	6	5.5	92
Eagles Nest	I	9	7.75	86
Unger	I	12	8.75	73
Buggy	I	10	6	60
Canyon	I	12	8	67
Cherry	I	18	1.5	8
W. Fork Bear	I	8	2.5	31
E. Fork Bear	I	5	3	60
Bluff	I	12	5.0	42
E. Fork Crow	I	11	10	91
Crow Creek	I	17	11.0	65
Snake	I	16	8.75	55
Cash Creek	I	13	1.75	13
E. Fork Cash Creek	I	6	2.25	37
W. Fork Cash Creek	I	3	.25	8
Chapman	I	10	7.5	70
Brazil Creek	I	18	8	44
*Willow Creek (South)	I	36	24	67
*Larb Creek	I	34	10	29
*Timber Creek	I	17	7	41
*N. Fork Willow Creek	I	12	7	58
*S. Fork Willow Creek	I	9	3	33
Total		418	202.25	48

* Streams may overlap into Missouri Breaks EIS Area.
1. Intermittent
2. Perennial

Source: BLM, 1980.

TABLE 3.5: SURFACE WATER QUALITY SURVEY, PHILLIPS AND BLAINE COUNTIES, MONTANA

Station	Sampling Date	Discharge cfs	Total Dissolved Solids mg/l	Conductivity umhos/cm field	pH field	Total Alkalinity as $CaCo_3$ mg/l	Bicarbonate meq/l	Chloride meq/l	Nitrate+ Nitrate as N mg/l	Total Hardness as $Caco_3$ mg/l	Calcium meq/l	Magnesium meq/l	Sodium meq/l	Potassium meq/l
#1	3-23	.28	84	156	7.2	40	.79	.05	-.01	51	.62	.40	.30	.11
Reser Creek	4-13	.01		350	7.2									
Blaine County	4-18	.15		320	6.7									
T34N, R18E, Sec 8	4-27	.37	218	330	7.2	84	1.68	.04	.02	121	1.32	1.10	.70	.13
	4-29	.02		360	7.4									
	5-02	.01		445	7.8									
	5-10	.02												
#2	3-09	5	174	250	6.9	41	.89	.18	.31	44	.55	.33	1.16	.35
	4-13	0												
Grable Creek	4-18	.24		505	7.6									
Blaine County	4-27	.05	282	410	7.6	73	1.46	.13	.03	99	1.22	.76	2.05	.15
T32N, R24E, Sec 19	4-29	0												
#3	3-23	4.50	52	74	7.4	23	.46	.04	-.01	20	.26	.15	.24	.09
	4-13	.07		255	7.1									
Woodpile Coulee	4-18	.06		340	7.6									
Blaine County	4-27	.27	150	260	7.3	89	1.78	.05	.01	95	1.09	.81	.63	.13
T36N, R18E, Sec 10	4-29	.09		300	7.9									
	5-02	.03		350	8.3									
#4	3-21	5.50	352	600	7.6	162	3.24	.11	.23	125	1.25	1.26	3.17	.22
	4-11	1.42		1090	7.6									
Lower Garland Coulee	4-17	1.50		1600	7.9									
Phillips County	4-25	1.38	1280	1950	7.6	530	10.15	.27	.02	389	3.29	4.48	12.99	.19
T32N, R29E, Sec 5	4-28	.49		2100	8.0									
	5-01	.28		2150	8.2									
	5-23	.20	1370	2240	8.3	667	12.67	.29	.01	435	2.33	6.37	15.80	.20
Upper Garland Coulee														
#5 Phillips County	3-18	12.80	72	77	6.5	19	.37	.04	.43	21	.28	.14	.06	.19
T33N, R29E, Sec 32														
#6	3-17	25.60	252	348	6.9	25	.50	.06	.13	81	.75	.87	1.38	.15
	4-12	2.50		960	8.1									
	4-24	9.50		880	7.2									
Cottonwood Creek Tributary	5-01	.02	1830	2450	7.2	82	1.64	.28	.01	730	5.34	9.26	10.87	.26
Phillips County	5-03	0												
T34N, R28E, Sec 32	5-05	.02		3600	7.8									
#7	3-17		246	420	6.7	62	1.25	.21	0.55	85	.80	.90	1.76	.17
	4-12	169		1060	8.3									
Cottonwood Creek	4-24	270		1500	7.8									
Phillips County	5-01	35	996	1580	8.1	347	6.61	.91	0.01	352	2.29	4.76	8.89	.21
T34N, R28E, Sec 29	5-03	56		1700	8.2									
	5-05	29.8		2150	8.3									
	5-18	22.01	1360	1920	8.7	531	10.62	1.25	0.01	433	2.77	5.89	13.69	.26
	6-13	0.91		2620	8.6									
	7-10	0.10												
	7-12	0.11	824	1100	6.2	132	2.64	0.83	0.02	273	2.41	3.05	5.66	.27
#8	3-20	300	304	505	7.3	119	2.38	0.28	0.47	99	.85	1.12	2.72	.22
	4-12	80		1000	7.9									
Woody Island Coulee	4-24	27.6												
Phillips County	4-29	50	914	1260	8.5	377	7.04	0.90	0.01	309	2.00	4.19	8.65	.21
T35N, R27E, Sec 34	5-02	34.2		1790	8.4									
	5-05	25.3		1920	8.4									
	5-22	13.8	1430	2120	8.7	577	11.53	1.37	0.01	429	2.47	6.11	14.65	.27
	6-13	0.31		2610	8.7									
#9	3-19	34.4	184	257	6.9	36	0.71	0.15	1.24	68	.66	.71	.79	.20
	4-12	10.3		550	7.5									
Black Coulee	4-24	27.5		742	7.6									
Phillips County	4-29	9.5	460	680	8.0	97	1.93	0.37	0.01	197	1.52	2.43	2.79	.19
T35N, R27E, Sec 32	5-02	3.4		940	8.1									
	5-05	1.63		2190	7.4									
	5-22	.01	2250	2700	8.0	170	3.40	1.19	-0.01	932	6.90	11.74	11.67	.33
#10	3-16	0.26	212	162	6.9	23	0.45	0.11	0.16	32	.34	.30	.65	.20
(Martins Coulee)	4-17	23.07		710	7.6									
Milk River Tributary	4-26	2.36	1120	1550	8.0	140	2.79	0.22	0.01	364	2.70	4.57	8.99	.16
Phillips County	4-28	.48		2500	8.2									
T33N, R31E, Sec 15														

Station	Sampling Date	Discharge cfs	Total Dissolved Solids mg/l	Conductivity umhos/cm field	pH field	Total Alkalinity as $CaCo_3$ mg/l	Bicarbonate meq/l	Chloride meq/l	Nitrate+ Nitrate as N mg/l	Total Hardness as $Caco_3$ mg/l	Calcium meq/l	Magnesium meq/l	Sodium meq/l	Potassium meq/l
#11	3-14	1.25	260	425	8.0	125	2.51	0.14	0.10	67	.67	.66	2.58	.15
	4-10	3.47												
Lower Whitewater Creek Tributary	4-11	1.46		530	8.0									
Phillips County	4-17	8.2		660	7.4									
T35N, R31E, Sec 5	4-26	3.74	664	1000	8.1	259	5.10	0.32	0.02	174	1.60	1.87	7.04	.16
	4-28	.53		1300	8.3									
	5-01	.29		1625	8.2									
	5-23	.16	1180	1920	8.4	662	12.57	.54	- .01	299	1.75	4.22	14.65	.15
	6-12	.16		1730	8.5									
	7-11	.06	1000	1580	8.9	511	8.74	0.45	0.02	194	1.17	2.72	12.50	.15
	7-24	0.15												
	8-23	0.23	1170	1830	8.2	619	12.38	0.75	0.04	250	1.69	3.32	14.37	.26
	11-12	0.10	1220	1920	8.0	694	13.89	0.64	0.15	338	3.01	3.74	14.72	.19
#12	3-15	1.02	302	445	8.2	60	1.19	.13	.26	62	.47	.77	2.59	.19
	4-11	.26		420	8.0									
Upper Whitewater Creek	4-17	3.6		370	7.5									
Phillips County	4-26	.21	604	920	8.5	218	4.16	.18	.01	234	1.85	2.83	4.98	.19
T35N, R30E, Sec 16	4-28	.05		1440	8.2									
	5-01	.05		2000	8.5									
#13	4-10	.03	44	31	7.3	9	.18	.07	- .01	11	.15	.07	.05	.08
East Fork Whitewater Creek Tributary	4-17	-.01		38	6.5									
Phillips County														
T36N, R31E, Sec 14 #14	3-29	13.8	930	1350	7.8	75	1.5	.11	.03	329	3.27	3.32	6.81	.15
	4-15	11.7		1820	7.7									
Lower Third Creek Tributary	4-27	9.3	856	1560	7.9	83	1.66	.11	.01	299	2.87	3.11	6.11	.14
	4-30	2.7		2300	7.8									
Phillips County	5-02	1.45		3500	7.8									
T23N, R30E, Sec 12	5-04	.77		3700	8.3									
#15	3-22	.69	50	43	6.9	10	.21	.03	-.01	8	.10	.06	.14	.10
	4-16	0												
Rudolph Coulee Tributary	4-23	0												
Phillips County	4-30	.01	110	180	7.2	25	.51	.07	.01	21	.20	.22	.38	.14
T28N, R29E, Sec 28	5-02	-.01												
#16	3-31	1.27	1110	1740	5.5	- 1	.01	.05	.07	256	2.34	2.77	9.90	.13
	4-14	1.16		2100	5.6									
Big Warm Creek Tributary	4-25	14.4		1360	5.7									
Phillips County	4-30	.09	3880	4800	5.2	2.0	.04	.11	-.01	955	7.59	11.52	33.68	.28
T27N, R28E, Sec 24														
#17	3-30	.34	1430	2050	7.8	85	1.71	.10	.06	385	4.06	3.64	12.58	.23
	4-15	5.88		2060	7.8									
Sage Creek	4-27	4.62	1830	2770	7.8	67	1.33	.14	.01	450	4.48	4.53	16.45	.23
Phillips County	4-30	.30		3650	7.8									
T25N, R32E, Sec 6	5-02	.30		5400	7.6									
	5-04	.02		7100	8.1									
#18	3-28	6.27	428	660	7.6	66	1.32	.08	.05	161	1.73	1.50	3.07	.14
	4-15	6.90		1520	7.7									
Upper Third Creek	4-28	5.62	870	1210	7.8	110	2.19	.11	-.01	309	3.09	3.10	6.37	.15
Phillips County	4-30	2.5		1740	7.6									
T24E, R30E, Sec 33	5-02	1.0		2360	7.5									
	5-04	.77		2500	7.8									
	5-16	.06	3670	4150	7.9	221	4.33	.27	-.01	1184	10.88	12.81	28.80	.28
#19	3-27	.96	1630	2160	7.9	77	1.55	.11	.04	555	5.06	6.01	11.18	.13
	4-14	2.29		4050	7.7									
Lower Dry Fork	4-19	4.09		2300	7.8									
Beauchamp Creek	4-26	42.0	870	1500	7.6	56	1.13	.07	.05	316	3.22	3.10	6.16	.11
Phillips County	4-28	2.99		3280	7.8									
T24E, R28E, Sec 29	4-30	1.11		4600	8.1									
	5-15	.11	6670	6750	8.3	165	3.16	.40	.01	2280	16.24	29.35	46.11	.34
#20	3-27	.22	3080	3800	7.8	136	2.71	.17	.02	945	6.42	12.50	23.86	.17
	4-14	.98		7000	8.2									
Upper Dry Fork	4-19	.59		4750	7.9									
Beauchamp Creek	4-26	9.50	1190	1750	7.7	65	1.30	.12	.02	441	3.22	5.60	8.89	.12
Phillips County	4-28	.76		5000	8.0									
T24N, R27E, Sec 14	4-30	.32		7000	8.2									
	5-15	.07	10,500	10,500	8.2	265	5.17	.42	.01	3330	19.72	46.81	79.90	.40

TABLE 3.5: CONTINUED

Source: Morrison-Maierle, Inc., 1980, Summary Report Inventory of Existing Water Quality and Quantity Phillips and Blaine Counties, Montana. Prepared for USDI, BLM.

TABLE 3.6: PRAIRIE POTHOLES EIS AREA RESERVOIR SEDIMENT SURVEY

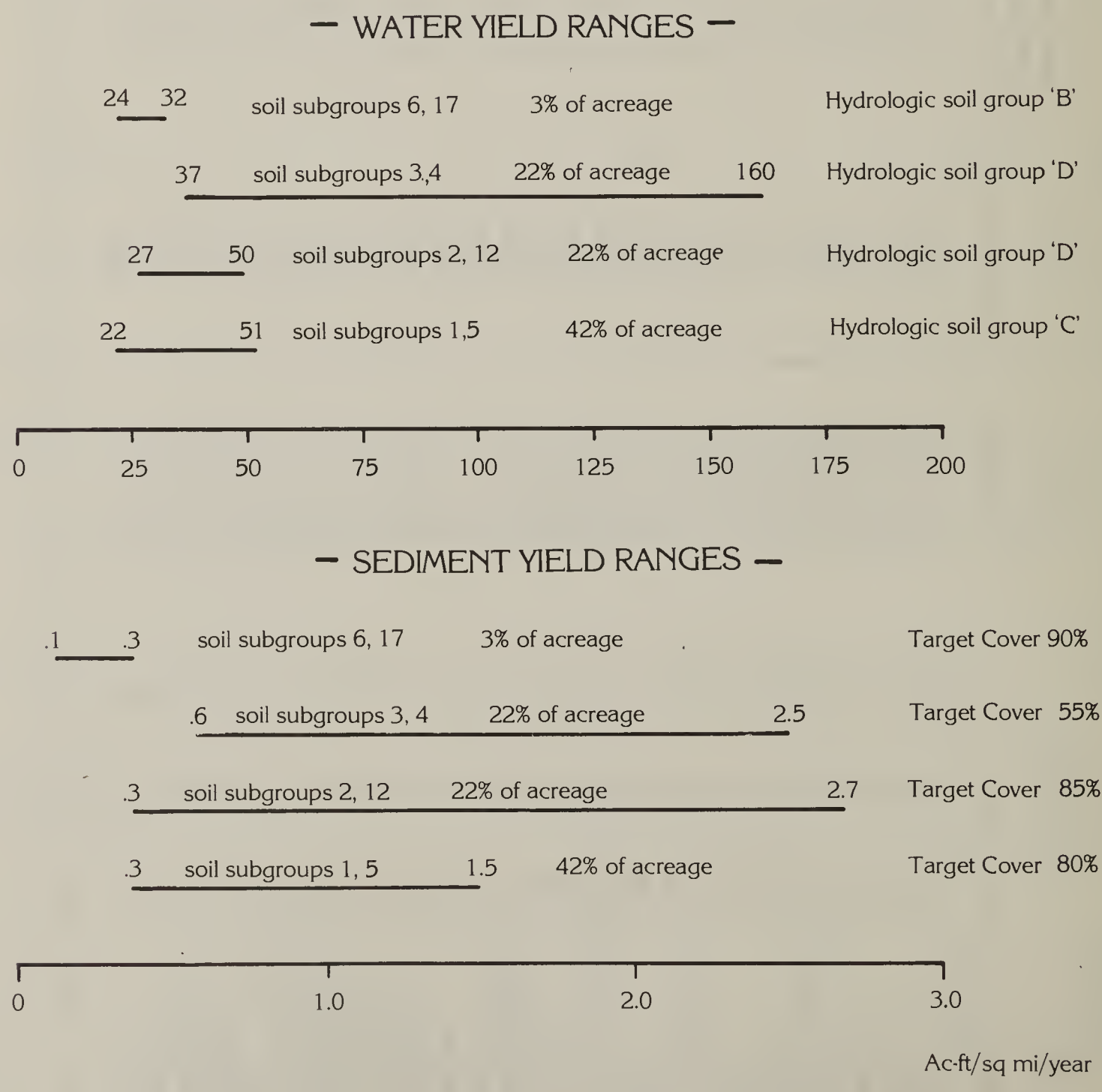
Reservoir #	Name	Location Twp.	Rg.	Sec.	Date Surveyed	Date Constructed	Reservoir Sediment Yield AC-FT per Sq Mile per Year	Tons per Sq Mile per Year	Average Annual Water Yield (AC-FT/Sq. Mile/Year)
1	Andy	29	28	30	06/25/79	1968	0.35	628.7	34.5
2	Multiple	29	28	34	06/27/79	1935	0.42	795.3	48.8
3	PR-309	25	29	12	06/29/79	1947	0.46	820.1	24.7
4	Teal	29	27	34	07/16/79	1936	9.44	17,470.1	50.1
5	Wild Goose	34	29	17	07/19/79	1945	1.49	2,351.2	36.7
6	BR-19	34	17	22	07/24/79	1936	0.11	200.3	25.5
7	Vin	34	18	7	07/25/79	1969	1.26	2,198.4	41.4
8	Buckley	33	22	24	07/27/79	1950	2.73	4,861.4	48.8
9	BR-6	33	20	18	07/31/79	1936	0.10	173.2	32.3
10	Bend	34	22	17	08/01/79	1966	1.23	1,969.6	41.2
11	Six	34	22	21	08/01/79	1966	0.30	539.2	45.7
12	BR-104	34	18	30	08/02/79	1960	0.32	539.5	36.4
13	Nesslar	33	21	15	08/03/79	1948	0.49	874.9	37.4
14	Homestead	37	18	31	08/14/79	1964	1.29	2,286.2	27.3
15	Jan	27	38	27	09/12/79	1972	1.57	2,117.3	75.7
16	Squite	27	28	22	08/17/79	1969	2.26	2,987.8	77.2
17	Brown	28	37	8	08/21/79	1967	0.99	1,425.3	113.2
18	Half	28	37	9	08/21/79	1950	0.61	925.6	48.2
19	Crappie	27	38	27	09/13/79	1967	0.85	1,192.6	78.1
20	Glut	28	36	24	08/24/79	1967	2.49	3,812.0	37.4
21	Junction	36	37	34	09/06/79	1963	1.00	1.456.9	51.3
22	Ripe	34	27	20	08/16/79	1957	0.23	399.2	35.0
23	VR-130	34	36	29	09/04/79	1948	0.35	633.5	22.2
24	VR-159	35	36	15	09/07/79	1948	0.27	500.7	23.9
25	Marlys	28	37	30	10/02/79	1963	2.48	3,508.2	159.8
26	Bean	27	37	14	09/13/79	1971	0.96	1,315.8	73.1

SOURCE: USDI, BLM, 1980, Inventory Report; Sediment and Water Yields; Unpublished.

From studies conducted in 1979-80, sediment yield and water yield estimates were developed for 25 reservoirs on public lands (Table 3.6, BLM, 1980 and Morrison-Maierle, 1980). The dominant soil subgroups were aggregated into four categories each having similar surface characteristics and limitations. These four categories represent 89 percent of the EIS area.

Vegetation cover data for the five categories was used to compute a range of possible sediment and water yields, that is, yields are dependent on the percent of a soil covered by vegetation. Figure 3.4 illustrates the range in vegetation cover for each of the five soil categories based on present management.

FIGURE 3.4: AGGREGATIONS OF SOIL SUBGROUPS BY EROSION/ SEDIMENT & WATER YIELD POTENTIAL, REPRESENTING 89% OF THE PUBLIC LAND ACREAGE



VEGETATION

The major vegetation types on public lands in the Prairie Potholes EIS area are grassland (1,417,515 acres), sagebrush (159,463 acres), greasewood (5,271 acres), saltbush (16,226 acres), juniper (45,072 acres), deciduous shrubs (17,042 acres) and deciduous trees (735 acres). Rangelands are predominately a grama-needlegrass-wheatgrass association with variations because of soil, climate, exposure, slope and ecological condition (i.e., the current plant community in relation to the potential plant community). If the area has more than 10 percent canopy cover of trees, it is considered woodland. The Sweet Grass Hills and Bears Paw Mountains are predominantly a conifer (1,726 acres) and mountain grassland type (16,815 acres). The timber, of limited commercial value, is unaffected by grazing use. In addition, 69,373 acres of barren areas, shale and rock outcrop and cropland are found on public lands. The general vegetation communities of the 19 soil subgroups are noted in Appendix 3.2 along with recommended management practices. Plant communities are further described in detail by range site in Appendix 3.4. Appendix 3.5 is a list of the plant species in the EIS area.

Much of the EIS area was homesteaded after the turn of the century and later repurchased by the Federal government under the Bankhead-Jones (Land Utilization) Act. Evidence of cultivation remains on these lands in the plow furrows and changes in plant composition along with fields of crested wheatgrass. Naturally revegetated fields ("go back" areas) on silty sites are predominantly needleandthread; on sites with more clay, western and thickspike wheatgrass dominate. Blue grama is greatly reduced on these areas some 45-60 years since the last tillage. Crested wheatgrass, often intermingled with native range, is found on 83,000 acres of public lands. When unfenced, crested wheatgrass receives little grazing use as the native range is preferred by livestock.

For interpretative purposes in this EIS, riparian zones are defined as a specialized form of wetland producing specific vegetation types which serve in streambank stabilization and control of water quality as well as providing wildlife habitat. Riparian zones along stream courses, which are included in soil subgroups 6 and 17, (50,920 acres) are wet or subirrigated and are characterized by streambank woody vegetation,including cottonwood, willow, boxelder, buffaloberry, snowberry and rose (Figure 3.5). Greasewood is the characteristic woody species on saline subirrigated sites. Periodically flooded lakes, pit reservoirs and prairie potholes (Figure 3.6) support riparian vegetation in the form of sedges, rushes, nuttall alkaligrass, western wheatgrass and foxtail barley (an invader species). Lakes, reservoirs and potholes with stable water levels are edged by

FIGURE 3.5

1. RIPARIAN

Permanent river or stream

CHARACTERISTIC VEGETATION

Cottonwood
Willow
Buffaloberry
Snowberry
Rose
Boxelder

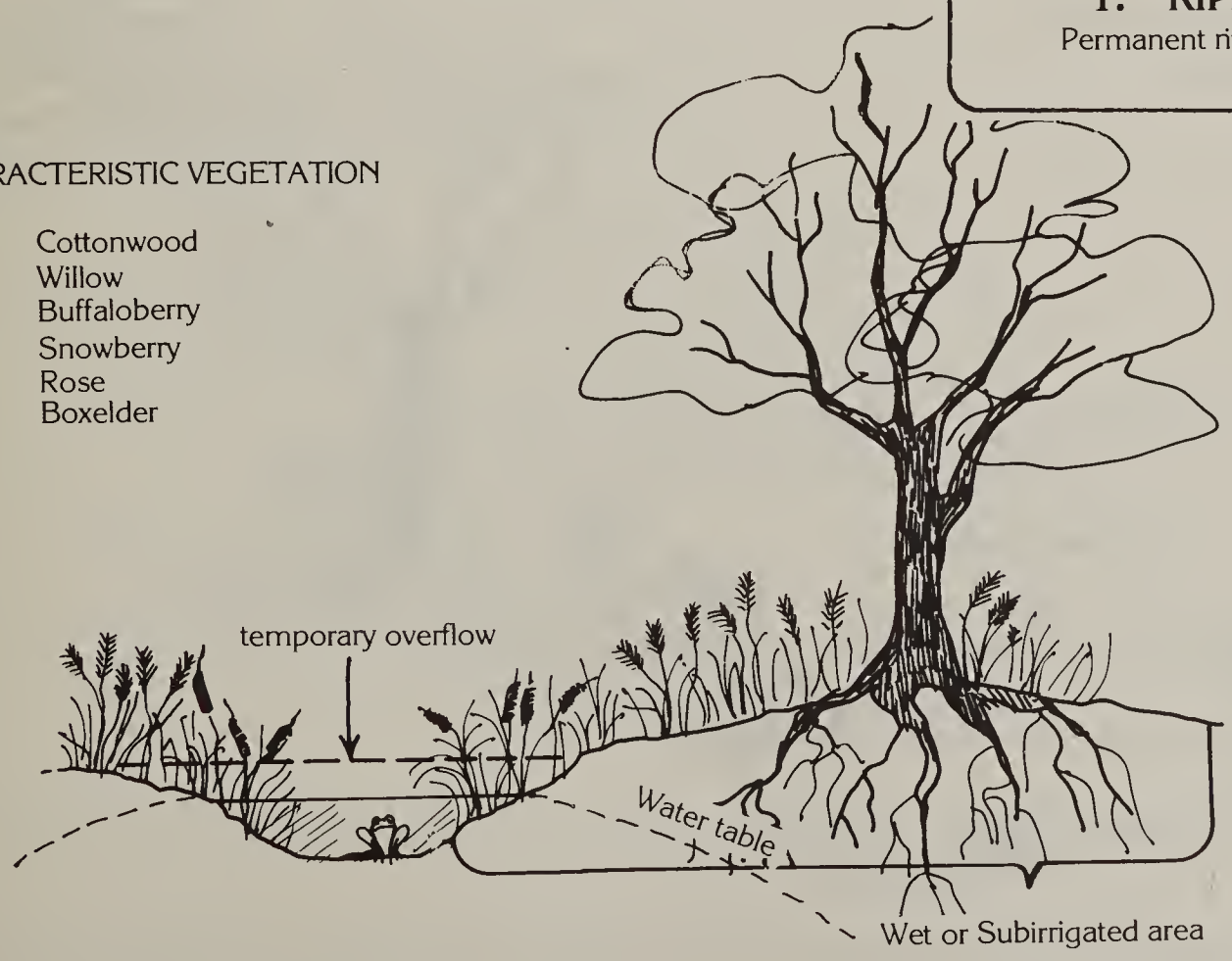
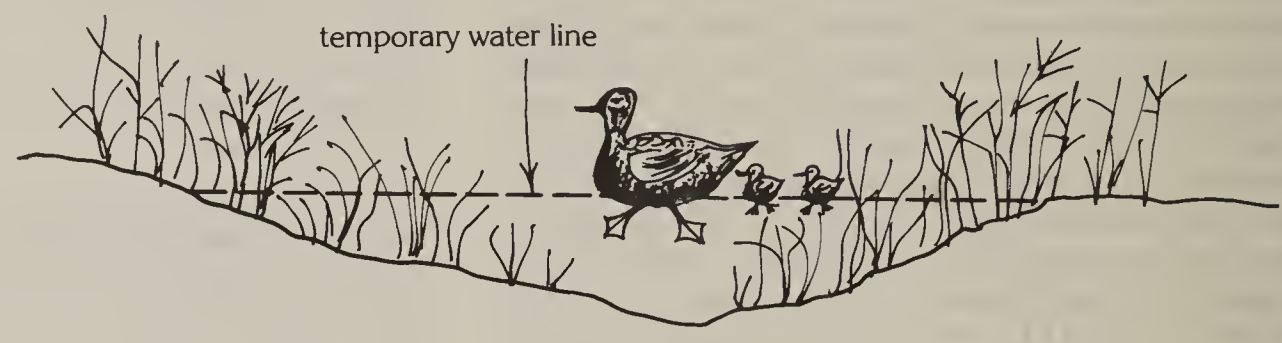


FIGURE 3.6
2. RIPARIAN
Periodically flooded lake, reservoir, pothole shoreline.

CHARACTERISTIC VEGETATION

Sedges
Rushes
Nuttall alkaligrass
Western wheatgrass
Foxtail barley (Invader)

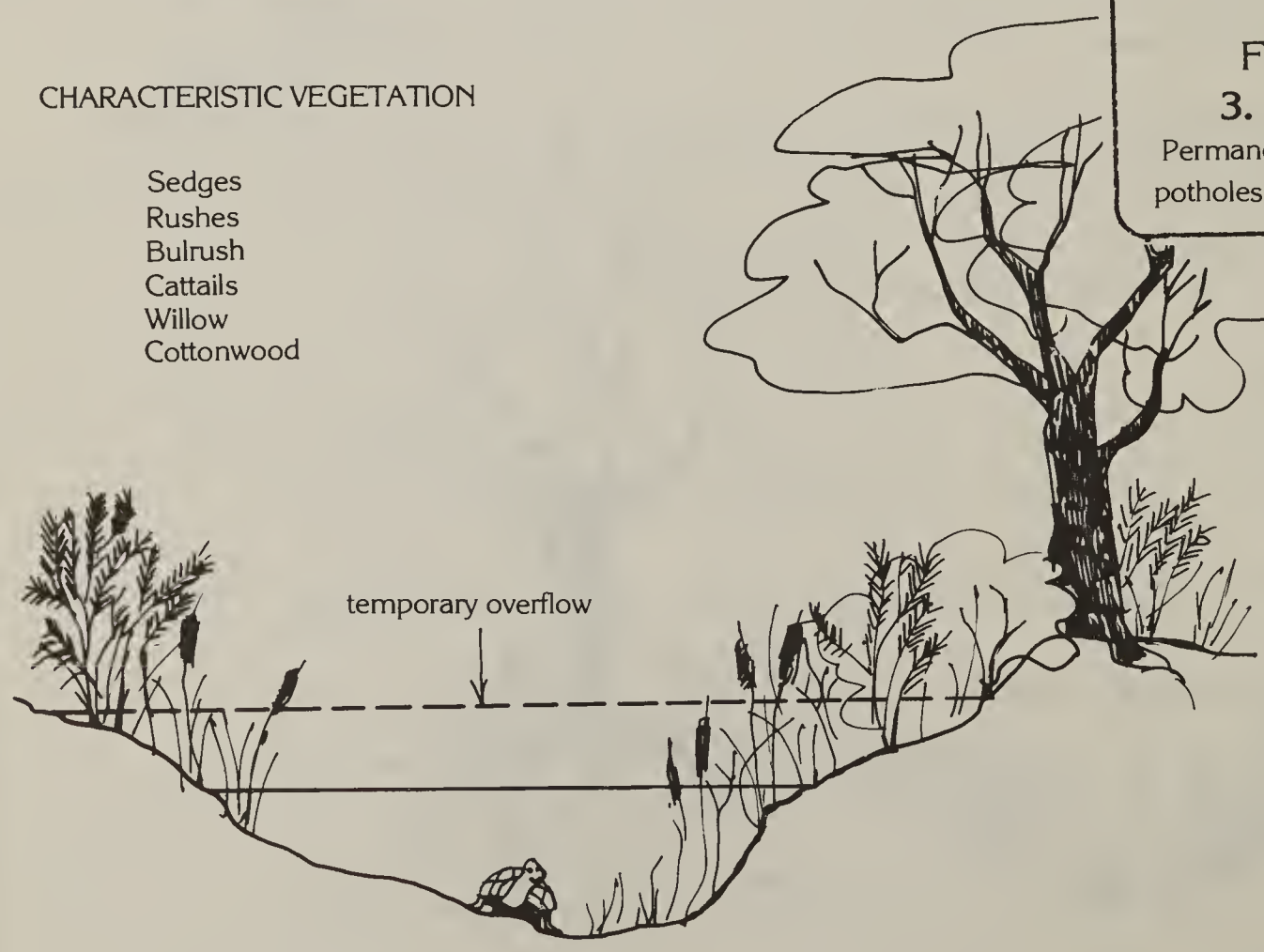


riparian zones of cottonwood, willow, cattail, sedge and rush species (Figure 3.7). Introduced species such as Russian olive, caragana, and elm also occur in these riparian zones. These zones are used disproportionally more than any other vegetation type for livestock grazing, watering, shade, travel, wildlife habitat and for concentrated waterflow. See the descriptions for wetland, subirrigated and saline lowland range sites for more details.

FIGURE 3.7
3. RIPARIAN
Permanent lakes, reservoirs, and potholes with stable water levels.

CHARACTERISTIC VEGETATION

Sedges
Rushes
Bulrush
Cattails
Willow
Cottonwood



The woody floodplain type included in soil subgroups 6 and 17 is located on abandoned or incised stream channels and is characterized by a woody species overstory with an understory of grasses. Overflow range sites, often adjacent to riparian zones but with no significant water table or stream influence, are included (Figure 3.8). Characteristic vegetation includes silver sagebrush, snowberry, rose, buffaloberry, boxelder, serviceberry and chokecherry. Mature cottonwoods, established before the channel was abandoned or incised, may also be found in this woody type. The woody draw type, found mainly in soil subgroups 1, 3, 4 and 5, dissects the uplands (Figure 3.9) and is characterized by buffaloberry, snowberry, rose, serviceberry, chokecherry and silverberry with willow and cottonwood near seeps or springs. The woody northerly slope type, also mainly in soil subgroups 1, 3, 4 and 5, has favorable soil moisture supporting such woody species as buffaloberry, common juniper, creeping juniper, snowberry, rose, skunkbush sumac, some quaking aspen and, along the Canadian border, Canada buffaloberry (Figure 3.10).



silver sagebrush

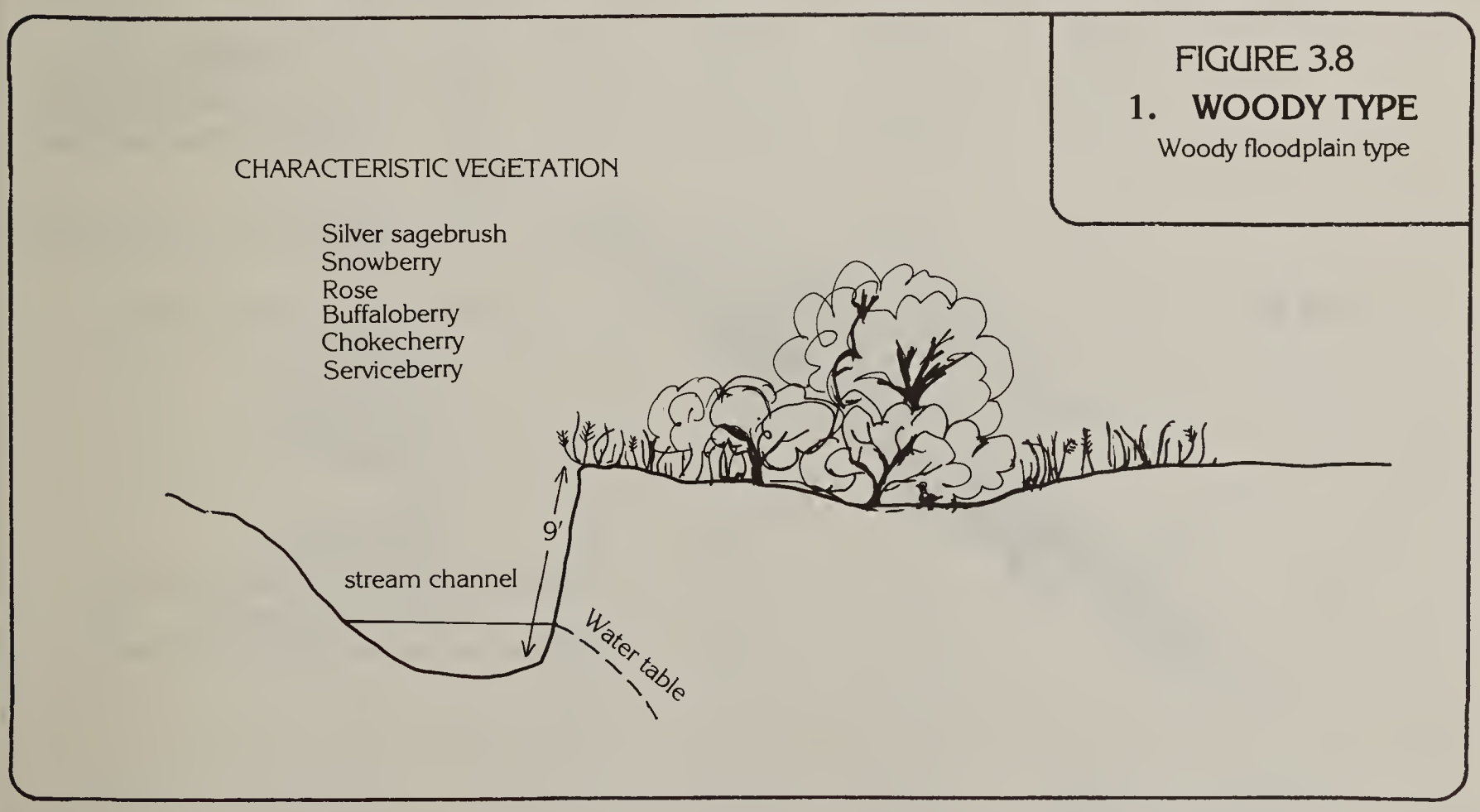
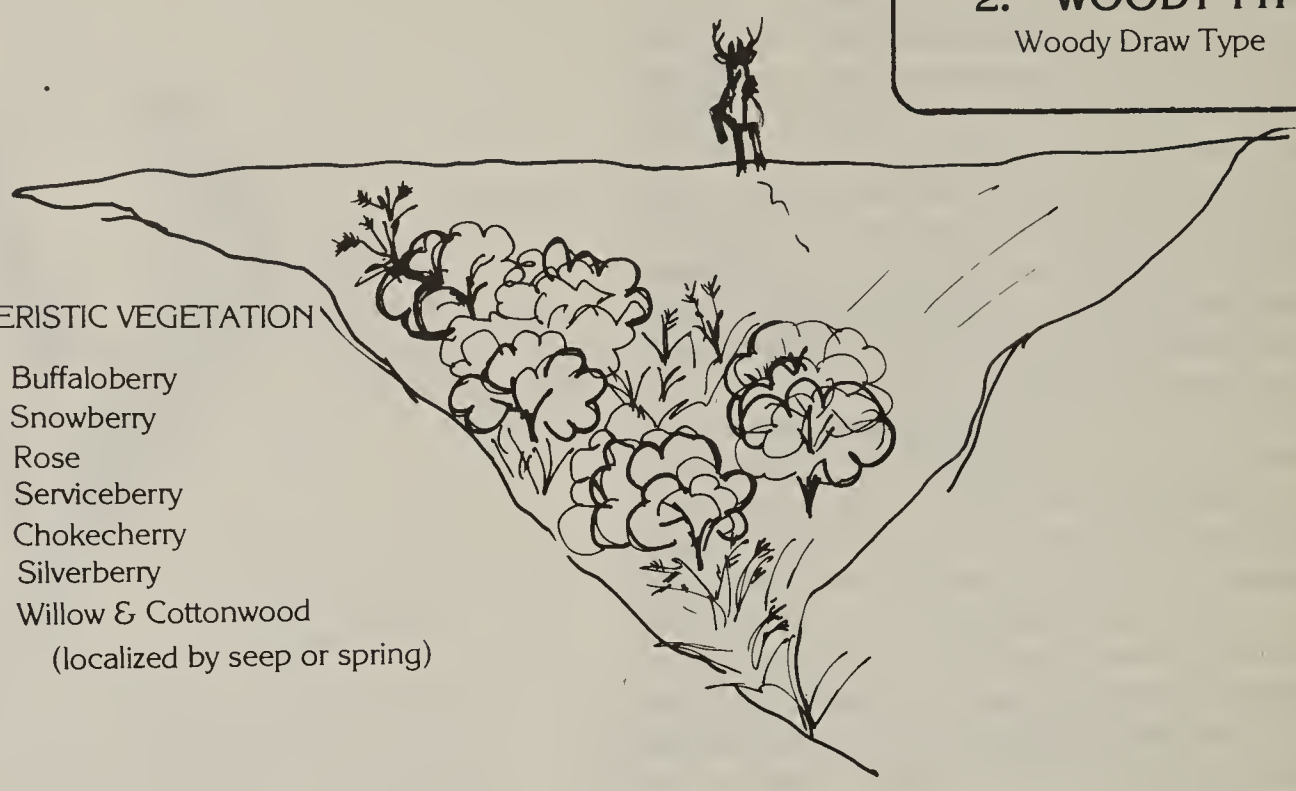


FIGURE 3.9

2. WOODY TYPE

Woody Draw Type



CHARACTERISTIC VEGETATION

Buffaloberry
Snowberry
Rose
Serviceberry
Chokecherry
Silverberry
Willow & Cottonwood
(localized by seep or spring)

FIGURE 3.10

3. WOODY TYPE

Woody Northerly slope type



CHARACTERISTIC VEGETATION

Buffaloberry
Common juniper
Creeping juniper
Snowberry
Rose
Skunkbush Sumac
Quaking Aspen
(localized mainly in Frenchman Creek area)
Canadian Buffaloberry
(localized near Canadian border on north slopes)

TABLE 3.7: ECOLOGICAL RANGE CONDITION BY SOIL SUBGROUP, IN ACRES AND PERCENT OF THE PRAIRIE POTHOLES EIS AREA

Soil Subgroup	Public Land Acres and % of Total	Excellent and %	Good and %	Fair and %	Poor and %	Unclassified and %
1.	687,322 39.3	4,375 .6	479,476 69.8	200,398 29.2	2,187 .3	886 .1
2.	357,191 20.4	2,355 .7	188,772 52.8	164,476 46.1	1,546 .4	42 -
3.	215,463 12.3	1,035 .5	130,495 60.6	83,882 38.9	51	
4.	173,169 9.9	715 .4	71,106 41	33,523 19.4	268 .2	67,557 39
5.	42,441 2.4	1,179 2.9	28,513 67.2	12,692 29.9	56	
6.	50,920 2.9	354 .7	32,963 64.7	16,074 31.6	675 1.3	85.4 1.7
7.	11,598 .7	91 .8	6,352 54.8	5,131 44.2	24 .2	
8.	10,489 .7	335 3.2	4,779 45.6	5,349 51	26 .2	
9.	33,805 1.9	639 1.9	17,528 51.9	15,379 45.5	247 .7	12 -
10.	47,278 2.7	725 1.6	23,322 49.3	22,972 48.6	237 .5	22 -
11.	25,240 1.4	430 1.7	12,100 48	12,629 50	81 .3	
12.	27,952 1.6	88 .3	12,345 44.2	14,939 53.4	580 2.1	
13.	54,225 3.1	66 .1	20,978 38.7	32,488 59.9	693 1.3	
14.	4,636 .3	70 1.5	3,215 69.3	1,223 26.4	128 2.8	
15.	1,351 .1	824 61	495 36.6	32 2.4		
18.	2,609 .1	576 22.1	1,376 52.7	657 25.2		
19.	3,549 .2	975 27.5	1,392 39.2	1,178 33.3	4	
Total	1,749,238 100	14,832 .8	1,035,208 59.2	623,022 35.6	6,803 .4	69,373 4

Source: BLM, 1980.

TABLE 3.8: RECOMMENDED DEFERMENT DATES TO ALLOW FOR THE FLOWERING OF KEY SPECIES

Geomorphic Soil Area	Key Species	Approx. Flowering Date	Rec. Deferment Date
Glacial Till Uplands			
Subgroups 1, 2	Western Wheatgrass	June 20	
	Green Needlegrass	June 10	June 15
	Needleandthread	June 20	
Sedimentary Uplands			
Subgroups 3, 16	Plains Muhly	July 30	
	Little Bluestem	July 30	July 30
	Prairie Sandreed	July 30	
Subgroups 4, 16	Bluebunch Wheatgrass	June 10	
	Western Wheatgrass	June 20	June 15
	Green Needlegrass	June 10	
Subgroup 5	Bluebunch Wheatgrass	June 10	
	Western Wheatgrass	June 20	June 15
	Needleandthread	June 20	
	Green Needlegrass	June 10	
Floodplains, Low Terraces and Wet Basin			
Subgroups 6, 7, 17	Western Wheatgrass	June 20	June 15
	Green Needlegrass	June 10	
Fans, Footslopes and Terraces			
Subgroups 8, 9, 10, 11, 12, 13, 14	Western Wheatgrass	June 20	
	Needleandthread	June 03	June 15
	Green Needlegrass	June 10	
Mountain Soils (Forest and Grasslands			
Subgroups 15, 19	Rough Fescue	June 20	
	Green Needlegrass	June 15	June 20
	Bluebunch Wheatgrass	June 15	

Range Condition, Production and Trend

Range condition, expressed as excellent, good, fair, poor or unclassified, reflects the current vegetation composition of the rangeland in relation to the potential climax plant community. SVIM data (BLM, 1978) show the present ecological range condition on public lands is 0.8 percent excellent, 59.2 percent good, 35.6 percent fair, 0.4 percent poor and 4.0 percent unclassified (cropland or barren areas of shale or rock outcrop with no vegetation potential). See Table 3.7 for a summary of range conditions by soil subgroups. Forage production is directly related to range conditions. SCS recommended stocking rates indicate that present forage production in the EIS area is 59 percent of the potential.

The opportunity for improving range condition and production with grazing management only is the greatest on clayey sedimentary uplands and alluvial terraces (soil subgroups 3, 4, 10 and 16, comprising 435,910 acres of public lands) and on the floodplains (subgroups 6 and 17, 50,920 acres). The ecological range condition of overflow range sites (soil subgroups 6 and 17) in allotments with an upward trend is normally higher than adjoining fans and footslopes because of the better response to management (BLM Condition Mapping, 1978-79). Rest rotation and deferred rotation systems that are designed to provide for the needs of the floodplain vegetation would improve range condition in a relatively short time. The recommended dates for periodic deferment on each soil subgroup until the flowering of key species can be found in Table 3.8.



Crested Wheat

Soil subgroups 8, 15 and 19 (15,389 acres of public lands) also respond well to grazing management. The acreage of these subgroups is very minor, however (see Table 3.2).

The EIS area is mostly made up of soil subgroups 1 and 2 (1,044,523 acres or 60 percent of public lands). Most soils in these subgroups, together with the soils in subgroups 5, 9, 10 and 11 (a total of 1,193,287 acres or 68 percent of public lands) become dominated by clubmoss, blue grama and cactus under intense grazing pressure. When present in high concentrations, clubmoss leaves and roots form a dense mat 2½-3 inches thick which intercepts and holds precipitation like a sponge. Much of the moisture does not penetrate this layer and is largely unavailable to desirable vegetation (Ryerson, et al., 1970). Once the dense mat of clubmoss and blue grama is established, recovery of the range is extremely slow under grazing management alone. See Table 3.7 for the acreages and range conditions of the soil subgroups.



yellow sweetclover

Annual vegetation production on rangelands in the EIS area varies widely with the fluctuations in precipitation. During years of favorable moisture, yellow and white sweetclover (introduced biannual species) produce large amounts of forage which is relished by grazing animals. This increase in production can be very dramatic. For example, production of one clayey range site in Phillips County was 1,650 lbs./acre in 1979. Of that total, only 320 lbs./acre was native grasses, forbs and shrubs; the remaining 1,330 lbs. (80 percent of the total production) was sweetclover (BLM Comparison Area Data, Phillips Resource Area, 1979).

Sweetclover is especially well adapted to the shallow clay, shallow acid clay, thin clayey and clayey range sites which normally have enough bare ground for plants to become established and a friable soil surface that serves as a good seedbed. The silty and claypan uplands, which grow little sweetclover, are preferred by livestock most years but are provided a natural deferment during "sweetclover years" when the plant attracts cattle away from these areas.

On the other end of the production spectrum are the below normal and drought years. Production of all vegetation is reduced markedly during these times. Sweetclover does not normally grow in drought years.

Periodic drought is a factor that must be taken into account in the management of rangelands on the Great Plains. Campbell (1936) compiled the differences in production on the short grass prairie in Eastern Montana during the droughts of the 1930s. Production ranged from a high of 807 lbs./acre to a low of 113 lbs./acre between the years 1927-34. A similar comparison was made by BLM in Valley County for the years 1978-80. Production on a shallow clay site in 1978 (an exceptionally wet year) was 788 lbs./acre. For 1979 (a favorable spring followed by a very dry summer), production was 270 lbs./acre; in 1980 (a drought year), production was 150 lbs./acre. Similar differences in production were noted on other range sites in Valley County during this same period (BLM Comparison Area Data, Valley Resource Area, 1978-80).

Annual actual use data and periodic trend data has been collected on the 93 AMP allotments in the EIS area. Methods of determining trend include photo-trend plots, point transects, aerial photography and professional judgment.

Trend was extremely hard to evaluate as most photo plots were located on claypan, dense clay or clubmoss-blue grama sites which are slow to respond to management. Range conservationists who were familiar with the AMP allotments in each resource area summarized all trend data in 1980 in Tables 3.9-3.12 and Appendix 3.6. The actual use data indicates stocking levels to be within 10 percent of permitted use. Ninety-six percent of the current AMPs show a static or upward trend.

Trend has not been determined on the remaining 419 potential AMP allotments. It is the general feeling of ranchers and most professionals that the range trend is fairly static or moving upward overall. This is supported somewhat by current range conditions indicated by AMP status in Table 3.13 (based on SVIM condition class results). See Appendix 3.7 for the trend of present AMP allotments by AMP status and Appendix 3.8 for the trend of present AMPs by allotment.

Leafy spurge, a perennial noxious weed which is a serious problem on Montana ranges, has infested about 2,200 acres of public lands in Valley County. Infestations of other noxious weeds, including spotted knapweed, Canada thistle, houndstongue and whitetop, have been located on public lands in the Havre Resource Area.



Leafy Spurge

Vegetation production and range condition are greatly reduced on prairie dog towns. These towns presently occupy about 1,700 acres in the EIS area. A rapid increase in prairie dog towns has been noted in the past 15 years in the adjoining Missouri Breaks EIS area and, to a more limited extent, in the Prairie Potholes EIS area.

No rare or endangered plant species are known to exist on public lands in the EIS area.

Needle and thread



Western Wheatgrass

TABLE 3.9: EXISTING AMP TREND SUMMARY FOR THE EIS AREA

Grazing Systems	Number AMPs & %	System Acres & %	TREND: Upward No. & %	Upward Acres & %	Downward No. & %	Downward Acres & %	Static No. & %	Static Acres & %	Not Evaluated No. & %	Not Evaluated Acres & %
Rest Rotation[1]	64	454,827	32	200,629.9	5	17,461.9	21	193,839.5	6	42,895.7
	68.8	81.4	50	44.1	7.8	3.8	32.8	42.6	9.4	9.4
Deferred[1] and Deferred Rotation	17	49,741.1	9	38,262	0	0	8	11,479.1	0	0
	18.3	8.9	52.9	76.9	0	0	47.0	23.1	0	0
Combination[2]	5	28,147.7	1	7,899.9			4	20,247.8		
	5.4	5.0	20.0	28.1			80.0	71.9		
Seasonal	4	3,942.4	2	1,518	1	2,024.6	1	399.8		
	4.3	.7	50.0	38.5	25.0	51.4	25.0	10.1		
Not Implemented	3	22,327.3					3	22,327.3		
	3.2	4.0					100	100		
TOTAL	93	558,985.5	44	248,309.8	6	19,486.5	37	248,293.5	6	42,895.7
TOTAL %	100		47.3	44.4	6.5	3.5	39.7	44.4	6.5	7.7

96.2% of AMP acres evaluated have upward trend or are static

1. Sometimes includes small pastures that receive seasonal use (breeding pastures, for example) and are not rested or deferred.
2. Includes both rest rotation and deferred rotation systems (many large allotments have more than one system).

Source: BLM, 1980.

TABLE 3.10: EXISTING AMP TREND SUMMARY FOR THE HAVRE RESOURCE AREA

HAVRE RESOURCE AREA

Grazing Systems	Number AMPs & %	System Acres & %	TREND: Upward No. & %	Upward Acres & %	Downward No. & %	Downward Acres & %	Static No. & %	Static Acres & %	Not Evaluated No. & %	Not Evaluated Acres & %
Rest Rotation	9	29,334.4	8	25,755.8			1	3,578.6		
		42.7	88.8	87.8			11.2	12.2		
Deferred & Deferred Rotation	8	12,783.2	2	6,768.9			6	6,014.3		
		18.6	25	53			75	47		
Combination	4	25.947.6	1	7,899.9			3	18,047.7		
		37.7	25	30.4			75	69.6		
Seasonal	1	718.5	1	718.5						
		1.0	100	100						
Not Implemented										
TOTAL		68,783.7		41,143.1				27,640.6		

Source: BLM, 1980.

TABLE 3.11: EXISTING AMP TREND SUMMARY FOR THE PHILLIPS RESOURCE AREA

Grazing Systems	Number AMPs & %	System Acres & %	TREND Upward No. & %	Upward Acres & %	Downward No. & %	Downward Acres & %	Static No. & %	Static Acres & %	Not Evaluated No. & %	Not Evaluated Acres & %
Rest Rotation	33	217,335.4	20	117,974	1	159.6	12	99,201.8		
	70.2	78.9	60.6	54.3	3	.1	36.4	45.6		
Deferred & Deferred Rotation	7	30,543.3	6	29,580.3			1	963		
	14.9	11.0	85.7	96.8			14.3	3.2		
Combination	1	2,200.1					1	2,200.1		
	2.1	.8					100	100		
Seasonal	3	3,223.9	1	799.5	1	2,024.6	1	399.8		
	6.4	1.2	33.3	24.8	33.3	62.8	33.4	12.4		
Not Implemented	3	22,327.3					3	22,327.3		
	6.4	8.1					100	100		
TOTAL	47	275,630	27	148,353.8	2	2,184.2	18	125,092		
TOTAL %	100	100	57.4	53.8	4.3	.8	38.3	45.4		

Source: BLM, 1980.

TABLE 3.12: EXISTING AMP TREND SUMMARY FOR THE VALLEY RESOURCE AREA

Grazing Systems	Number AMPs & %	System Acres & %	TREND Upward No. & %	Upward Acres & %	Downward No. & %	Downward Acres & %	Static No. & %	Static Acres & %	Not Evaluated No. & %	Not Evaluated Acres & %
Rest Rotation	22	208,157.2	4	56,900.1	4	17,302.3	8	91.059.1	6	42,895.7
	91.7	97.0	18.2	27.3	18.2	8.3	36.4	43.7	27.3	20.6
Deferred & Deferred Rotation	2	6,414.6	1	1,912.8	0	0	1	4,501.8	0	0
	8.3		50.0	29.8	0	0	50.0	70.2	0	0
Combination										
Seasonal										
Not Implemented										
TOTAL	24	214,571.8	5	58,812.9	4	17,302.3	9	95,560.9	6	42,895.7
TOTAL %	100	100	21	27.4	17	8.1	37	44.5	25	20

Source: BLM, 1980.

TABLE 3.13: PRAIRIE POTHOLES EIS RANGE CONDITION SUMMARY
BY AMP STATUS (Acres and Percent)

AMP Status	Total Acres		Excellent		Good		Fair		Poor		Unclassified	
	BLM	Other	BLM	Other	BLM	Other	BLM	Other	BLM	Other	BLM	Other
Existing	558,986	257,250	4,749	1,721	334,006	172,534	198,556	76,778	2,638	1,108	19,037	5,109
AMPs	32	29.3	.8	.7	59.8	67.1	35.5	29.8	.5	.4	3.4	2
Proposed*	455,009	163,509	3,899	1,231	186,422	79,771	238,943	78,846	1,214	528	24,531	3,133
AMPs	26	18.6	.8	.8	41	48.8	52.5	48.2	.3	.3	5.4	1.9
Potential**	607,745	375,787	4,572	3,355	443,940	277,235	139,104	82,204	2,103	477	18,026	12,516
AMPs	34.7	42.8	.8	.9	73	73.8	22.9	21.9	.3	.1	3	3.3
Non-	121,253	81,538	1,519	503	68,083	48,441	43,551	29,151	781	59	7,319	3,384
AMPs	6.9	9.3	1.3	.6	56.3	59.4	35.9	35.7	.6	.1	.6	4.1
Unallocated	6,245	273	93		2,757	256	2,868	15	67		460	2
	.4		1.5		44.1	93.8	45.9	5.5	1.1		7.4	.7
Totals	1,749,238	878,357	14,832	6,680	1,035,208	578,367	623,022	266,994	6,803	2,172	69,373	24,144
	100	100	.8	.8	59.2	65.8	35.6	30.4	.4	.2	4	2.8

* Proposed AMPs Alternative B (also in A, C, and D).
** Proposed AMPs Alternative A, C, and D.

Source: BLM, 1980.

LIVESTOCK

About 650 operators are licensed to graze a total of 319,065 AUMs in the 904 allotments in the EIS area. These AUMs are the equivalent of 53,177 cattle grazing for six months.

The typical grazing period on BLM allotments is six months (May-October) but grazing begins in April and extends through November on some allotments. For most operations, the total grazing period on public and private lands is April-December, a total of 7½-8 months. During the rest of the year, livestock are moved to winter pastures and fed hay and supplements on private or state lands. The overall average dependency upon public lands is about 30 percent,although many operations depend heavily on BLM allotments during the spring and summer months while they irrigate, hay and farm their private lands. Dryland croplands are used as fall pasture on many ranches.

Cattle ranching is the main livestock enterprise on public lands in the EIS area. Eight sheep allotments in the area account for 1,692 AUMs or .5 percent of the total livestock AUMs allocated by BLM. Most ranches are one family or multi-family cow/calf operations often involved in cross breeding programs. Hereford and Angus are the dominant cattle breeds but Simmental, Maine Anjou, Charlois and other breeds have become very popular in the area in the past ten years. High beef production with weaning weights of 400-500 pounds and calf crops of more than 90 percent are typical of the better ranching operations in the area (Robert Fjeldheim, 1980, Glasgow Livestock Sales,Personal Communication).



The 2,298 reservoirs which have been constructed on public lands have aided livestock grazing in the EIS area,although the availability and quality of water are still limiting factors on many allotments. Poor maintenance of reservoirs contributes to this problem.

Fly and mosquito dust bags, back scratchers and oilers are often located near water sources. These devices reduce stress caused by blood loss in cattle and lessen the energy they expend in trying to rid themselves of insects. Cattle also graze more during the day when free from insects. Salt is often placed near water sources, too, and the limited shade in most allotments is in woody draws or riparian zones.



During the period 1964-75, 93 allotments were included in 85 AMPs developed cooperatively between ranchers and BLM. These AMPs include 32 percent of the public lands in the area. Of the 93, 64 use rest rotation grazing systems, 17 use deferred rotation, 5 combinations of rest and deferred systems and 4 seasonal use systems. Three approved AMPs in the Phillips Resource Area have not yet been implemented. The remaining 419 potential AMP allotments mainly have seasonal use systems. Many are quite small and grazing management options are limited as a result (see Appendix 2.3 and the Allotment Overlay).

A few ranchers with AMP allotments feel that weaning weights of calves are reduced by the stress involved in moving from pasture to pasture.

Grazing systems can contribute to beef production by reducing the size of pastures which improves breeding success, thus improving calf crops and minimizing the culling of dry cows. A few AMPs have specific breeding pastures and facilities for artificial insemination.

Current Vegetation Allocations

Range surveys and adjudications in the EIS area in the late 1950s and early 1960s established the current livestock use allocations and seasons of use for allotments in Blaine, Phillips and Valley Counties. Allocations were also made to provide for the wildlife populations which existed at that time, a period of high deer and antelope populations.

Some of the Section 15 lands (outside grazing districts) have never had detailed range surveys. A comparison of the SCS stocking levels with BLM rates shows the need for more detailed inventories on these scattered tracts (see Appendix 2.3, "Non-AMP Allotments").

WILDLIFE

Wildlife habitats, including vegetation types such as grassland, grassland-shrub, shrub, woodland, riparian and agricultural lands, and special habitat features, such as natural potholes, reservoirs, cliffs, snags, springs and streamside and reservoir riparian zones, fulfill the needs of a wide variety of wildlife species in the Prairie Potholes EIS area.

Most wildlife in the area use riparian and woodland habitats much more than other types (Thomas, et al., 1976). The diversity offered by tree, shrub and herb layers provide nesting, roosting, hiding, escape and thermal cover for large, varied wildlife populations (BLM, Nongame Studies, 1980). Riparian vegetation also provides many important food plants to wildlife. Plants in riparian zones remain green and nutritious longer than the surrounding upland vegetation because they receive more moisture from their proximity to stream courses, lakes, reservoirs and springs. These plant species are discussed in the "Vegetation" section of this chapter.

Drainage bottoms with brushy side slopes maintain deer and sharp-tailed grouse populations. Some of the most important winter habitat for antelope and sage grouse occur on the broader drainage bottoms where sagebrush flourishes. Waterfowl production in the area is primarily dependent on potholes and reservoirs. Predators and raptors are attracted to these areas because of the greater numbers of prey.

The riparian zone is also a crucial part of the aquatic habitat on streams (Duff, 1977; Platts, 1978; Mechan and Platts, 1978; Armour, 1978 and others).

Riparian zones make up a very small percentage of the total acreage in the EIS area. Considering a 50-foot wide zone along stream courses, riparian zones account for approximately 6 acres per mile for 186 miles or only .06 percent of the whole EIS area. Since livestock also concentrate in riparian and/or wetland zones, these areas have lower vegetation diversity, less tree and shrub canopy and inadequate reproduction of desirable plants.

A BLM stream survey has determined that of the 186 miles of major riparian zones on public lands in the EIS area, 6 miles (3 percent) is in excellent habitat condition, 52 miles (28 percent) is good, 91 miles (49 percent) is fair and 37 miles (20 percent) is in poor condition (BLM, 1980; see Appendix 3.9). This means that 58 miles (31 percent) of the riparian zones are in satisfactory habitat condition while 128 miles (69 percent) are in fair or poor habitat condition.

The diversity of habitat in the Prairie Potholes EIS area supports 145 resident and 234 migratory wildlife species consisting of 57 mammals, 278 birds, 13 reptiles, 6 amphibians and 52 fish (See Appendix 3.10; a species list by season of use is also on file in BLM's Havre, Phillips and Valley Resource Area Offices). Not all of these species are discussed in this document. Emphasis has been placed on those species whose populations or habitats would be significantly affected by one of the alternatives. Species with limited populations or habitats would probably remain unaffected and are therefore only discussed incidentally.

Big Game

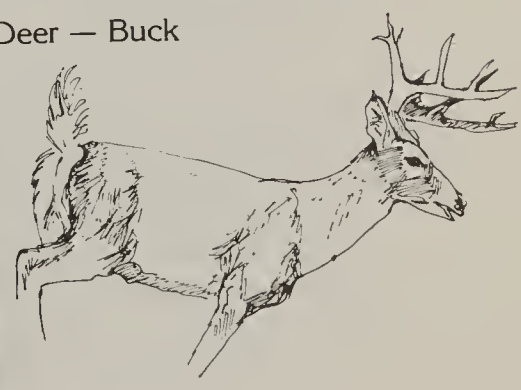
DEER

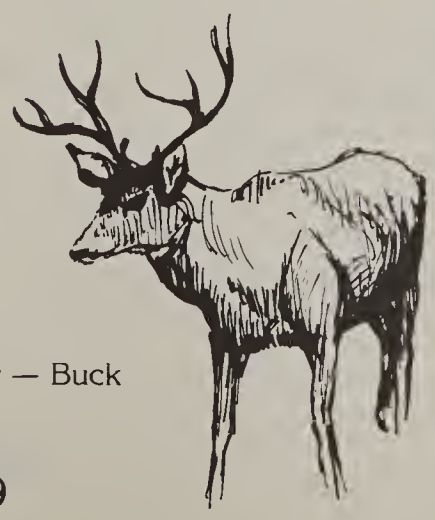
Deer are the most numerous big game animals in the EIS area. Mule deer inhabit drainage bottoms and the rough, broken, side slopes of these drainages as well as some upland areas where sagebrush is common. White-tailed deer also prefer drainage bottoms, especially those with tall brushy vegetation, often near private croplands. The large grassland areas that lie between drainages are of less value to deer than any other habitat type. This discussion applies to both species because of their close association in major drainages in the area.

Nearly 1,558,000 acres of general yearlong deer habitat and 192,000 acres of crucial deer winter habitat are on public lands in the Prairie Potholes EIS area (Table 3.14; Montana Department of Fish and Game, 1969). These lands presently support about 8,000 deer, the majority of which are mule deer (Montana Department of Fish, Wildlife and Parks, and BLM, Winter Surveys 1974-79). Herd composition, hunter success and winter range trend counts conducted by the Montana Department of Fish, Wildlife and Parks and BLM (1975-79) indicate that deer populations are increasing following a decline in the early 1970s.

In the spring during greenup, deer feed extensively on succulent green grasses until forbs are available. They use forbs, supplemented by some browse, throughout the summer, turning to heavy use of browse in the fall, winter and early spring. Food habits of deer in the area were typified by Dusek (1971) in a study he conducted in North Phillips County (Table 3.15). The plants used most by deer in Montana, due either to availability or preference, are presented in Table 3.16.

Whitetailed Deer — Buck





Mule Deer — Buck

TABLE 3.14: HABITAT OF MAJOR WILDLIFE SPECIES IN THE EIS AREA
(in 000's of Acres)[1]

Species	Public Land	Private Land	State Land	Total
Antelope				
Crucial High Value	72 (28%)	170 (66%)	15 (6%)	257
High Value	348 (48%)	324 (45%)	47 (7%)	719
Medium Value	294 (52%)	235 (41%)	38 (7%)	567
	714 (46%)	729 (47%)	100 (7%)	1,543
White-Tailed Deer				
Crucial High Value	12 (6%)	188 (90%)	10 (4%)	210
High Value	9 (22%)	29 (71%)	3 (7%)	41
	21 (8%)	217 (87%)	13 (5%)	251
Mule Deer				
Crucial High Value	180 (37%)	279 (57%)	28 (6%)	487
High Value	239 (45%)	269 (50%)	29 (5%)	537
Medium Value	48 (60%)	27 (34%)	5 (6%)	80
	467 (42%)	575 (52%)	62 (6%)	1,104
Elk				
Crucial High Value	4.2 (40%)	4.6 (44%)	1.7 (16%)	10.5
High Value				
Medium Value				
Sage Grouse				
Crucial High Value	182 (45%)	198 (49%)	24 (6%)	404
High Value	123 (46%)	130 (48%)	17 (6%)	270
Medium Value	90 (62%)	51 (35%)	5 (3%)	146
	395 (48%)	379 (46%)	46 (6%)	820
Sharp-Tailed Grouse				
Crucial High Value	183 (37%)	280 (56%)	33 (7%)	496
High Value	154 (39%)	219 (56%)	21 (5%)	394
Medium Value				
	337 (38%)	499 (56%)	54 (6%)	890
Ring-Necked Pheasant				
Crucial High Value	7 (6%)	97 (89%)	5 (5%)	109
High Value	8 (18%)	37 (80%)	1 (2%)	46
	15 (10%)	134 (86%)	6 (4%)	155

1. Montana Department of Fish & Game, 1969

TABLE 3.15: SEASONAL FOOD HABITS OF MULE DEER IN COTTONWOOD CREEK NORTH PHILLIPS COUNTY, MONTANA [1]

Season	Seasonal Preference		
	First	Second	Third
Spring	Browse (59%)	Forbs (24%)	Grass (17%)
Summer	Forbs (54%)	Browse (43%)	Grass (3%)
Fall	Browse (81%)	Forbs (16%)	Grass (3%)
Winter	Browse (60%)	Forbs (40%)	Grass (0%)

[1] Dusek, 1971.

TABLE 3.16: PLANTS MOST UTILIZED BY DEER IN MONTANA.

Browse [2]	Forbs
Big sagebrush	Alfalfa
Common juniper	American vetch
Rabbitbrush	Common bastard toadflax
Rose	Common dandelion
Snowberry	Hood's phlox
Chokecherry	Lomatium
Silver Buffaloberry	Prairie onion
Skunkbush sumac	Summer cypress
Willow	Prairiesmoke
Cottonwood	Pussytoes
Silver sagebrush	Sagebrush buttercup
Red-aster dogwood	Scarlet gaura
Serviceberry	Yellow fritillary
Plains poplar	Yellow, salsify
Winter fat	Yellow sweetclover
Nuttall saltbush	Prickly lettuce
Creeping juniper	Small soapweed
Grass	American licorice
Prairie junegrass	Fringed sagewort
Sandberg bluegrass	Wild buckwheat
Western wheatgrass	Clover
Wheat	Fireweed
Barley	

1. From Wilkins, 1956; Lovvas, 1957; South, 1957; Allen, 1965; Mackie, 1965; Martinka, 1965; Kamps, 1969; Dusek, 1971; and Egan, 1971.
2. Browse, forbs and grasses which are important in Montana deer studies and known to occur in the EIS area.

Deer usually come out of the winter in less than good physical condition and highly nutritious forage during the spring and summer is necessary to restore their physical condition. Pregnant does require nutritious forage during the last two months of gestation and while nursing the fawn. If this forage is not available, fawn losses are high (Verme, 1969).

Cover is also important in maintaining deer populations. Without sufficient cover, fawns are easily susceptible to predators and bad weather. Woody vegetation is important in reducing the effects of weather, especially during severe spring and winter storms. Deer also use the woody vegetation for bedding cover during the heat of the day and at night (Julander, 1966; Schneegas and Bumstead, 1977; and Swank, 1958).

Although the highest densities of deer are found along drainages and areas of rough topography in the winter, they tend to be distributed over the entire EIS area during the summer months. Grassland, grassland-shrub and agricultural vegetation types provide them with succulent small grains and forbs. Cover requirements are not so crucial during the warmer months.

Deer in the area are nonmigratory; however, they concentrate more in the winter (Map 4, *Map Supplement*), moving to the warmer south and southwestern open slopes of major drainages. In severe winters deer congregate on private agricultural lands and can cause severe haystack damage. Important vegetation providing cover and forage here include grassland-shrub, shrub, woodland and riparian types.

Appendix 3.11 gives deer population estimates by hunting unit. Habitat on both the summer and winter deer range is generally adequate to sustain the current population (Richard Trueblood, 1979, Montana Department of Fish and Game, Personal Communication). The SVIM range survey (BLM, 1980 indicated that public lands in 60.1 percent of the Havre Resource Area, 73.8 percent of the Phillips Resource Area and 44.6 percent of the Valley Resource Area are in good to excellent ecological range condition. Good and excellent range condition provides a quality diet of forbs, shrubs and grasses needed by deer to maintain their populations and survive the severe winters in the Prairie Potholes EIS area.

When livestock and deer compete for forage on ranges in poor and fair ecological range condition, they conflict more in food habits than when the range is in good condition. This is because fewer quality forage plants comprise the plant community in the lower ecological range conditions. Deer feed primarily on browse throughout the year and Dusek (1971), reported that cattle in the EIS area also use browse if grass becomes scarce. Cattle are usually moved from the range in late fall, however, before competing with deer for browse. Conflicts could still occur if cattle use the range heavily before being moved, especially if the range is in fair or poor ecological range condition to begin with.

ANTELOPE

Pronghorn antelope are the next most numerous big game animals in the Prairie Potholes EIS area. Appendix 3.11 displays population estimates for each hunting unit. Herd composition information indicates good fawn production and survival rates for the area, probably because of adequate habitat conditions (Montana Department of Fish, Wildlife and Parks, 1974-79).

There are approximately 72,000 acres of crucial antelope habitat on public lands in the area used by both resident herds and migratory herds from Canada (Table 3.14). Apparently, Canadian herds move into the area during severe winters because of the lack of winter habitat further north. The numbers of this migratory herd cannot be estimated as the antelope moving south depend on the severity of the winter and the population on the Canadian summer ranges. The estimated yearlong antelope population on public lands in the area is 4,750 (Appendix 3.11). Map 4 shows the winter ranges of antelope in the Prairie Potholes EIS area.

Antelope use a variety of vegetation types in the area throughout the year. Grassland, grassland-shrub, shrub and agricultural types are used in the spring, summer and early fall while antelope concentrate on grassland-shrub and shrub types during the winter.

Browse is vital in the antelope diet; sagebrush constitutes a very large part of their yearlong forage (Table 3.17). Winter diet usually consists of at least 80 percent sagebrush. In the spring, succulent green grasses are used for 1-2 weeks before forbs are available. Also important in the spring, summer and early fall are seasonal forbs. Plants more commonly used are shown by season of use in Table 3.18. These plants are commonly found in the grassland, grassland-shrub and agricultural vegetation types.

Crucial winter habitat includes sagebrush and shrubs between 12-24 inches in height, especially when snow covers the shorter sagebrush plants. Vegetation cover is also necessary for fawning as it protects the young from predators and severe winters (Autenrieth, 1978). Sagebrush 12-24 inches in height with 20 percent canopy cover meet this particular need of antelope.



TABLE 3.17: FOOD HABITS OF PRONGHORN ANTELOPE FOR EACH SEASON OF THE YEAR IN CENTRAL MONTANA [1]

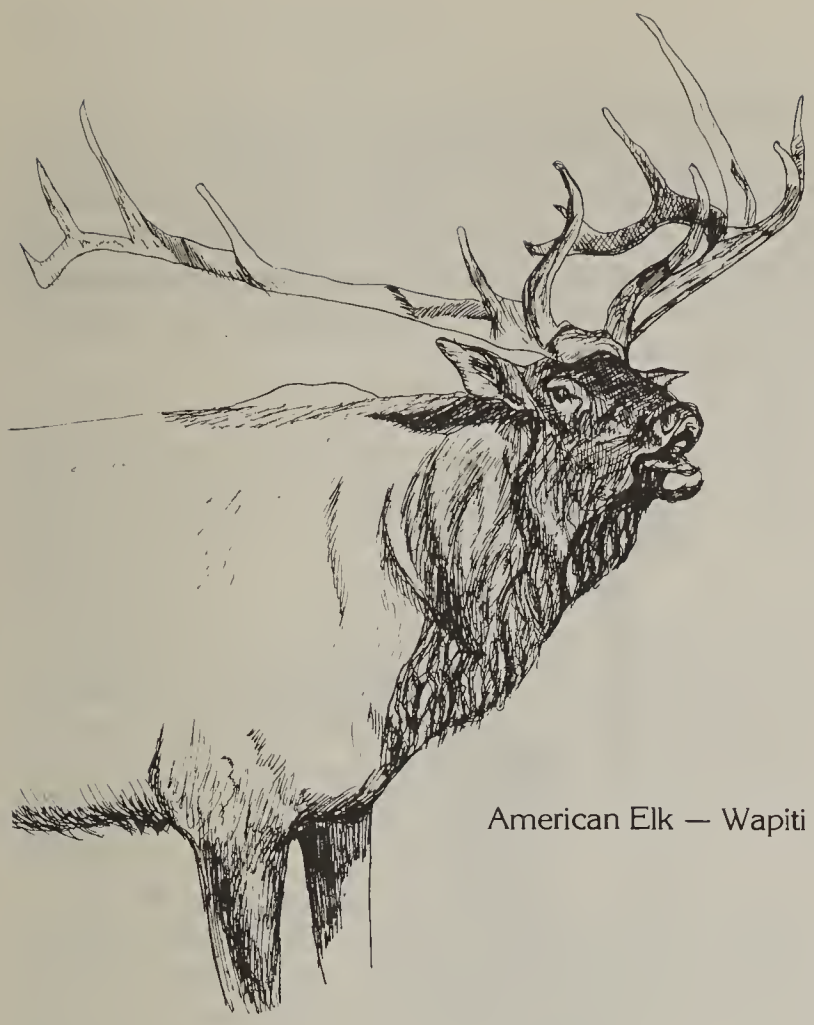
	Seasonal Preference		
Season	First	Second	Third
Spring	Browse (71%)	Forbs (21%)	Grass (8%)
Summer	Forbs (66%)	Browse (33%)	Grass (1%)
Fall	Browse (50%)	Forbs (48%)	Grass (2%)
Winter	Browse (98%)	Grass (1.5%)	Forbs (.5%)

[1] After Cole 1955

TABLE 3.18: PLANTS MOST UTILIZED BY PRONGHORN ANTELOPE IN MONTANA [1].

Browse [2]	Forbs
Big sagebrush	Common bastard toadflax
Silver sagebrush	Western yarrow
Greasewood	Hairy seed lomatium
Winterfat	Hood's phlox
Rabbitbrush	Knotweed
Rose	Cudweed sagewort
Sunkbrush sumac	Fringed sagewort
Western snowberry	Scarlet globemallow
Nuttall saltbush	Silver scurfpea
	Small soapweed
Grass	Yellow sweetclover
	Thistle
Bluegrass	Onion
Wheat	Sagebrush buttercup
Barley	Wavyleaf agoseris
Blue grama	Yellow salsify
Brome grass	Alfalfa
Wheatgrass	Aster
	Common dandelion
	Field bindweed
	Prairie clover
	Prickly lettuce

1. From Buck, 1947; Cole, 1955; Cole and Wilkins, 1958; Campbell, 1970; and Roberts, 1970.
2. Browse, forbs, and grasses which are important in Montana antelope studies and known to occur in the EIS area.



American Elk — Wapiti

TABLE 3.19: FOOD PREFERENCES OF ELK IN THE MISSOURI RIVER BREAKS OF CENTRAL MONTANA [1]

	Seasonal Preference		
Season	First	Second	Third
Spring	Grass (82%)	Forbs (13%)	Browse (5%)
Summer	Forbs (75%)	Browse (14%)	Grass (11%)
Fall	Grass (62%)	Forbs (23%)	Browse (15%)
Winter	Grass (78%)	Browse (17%)	Forbs (5%)

[1] After Mackie, 1970.

ELK

The only elk population in the Prairie Potholes EIS area is found in the Sweet Grass Hills of north Toole County which contains about 4,200 acres of habitat on public lands (Table 3.14 and Map 4). The herd numbers about 150 elk and will probably maintain this population because a majority of the habitat is on private lands. Landowners are reluctant to allow the herd to expand because of hunter problems and winter damage to agricultural areas by elk. The estimated population on public lands is 50 (Appendix 3.11). A detailed map of elk habitat in the Sweet Grass Hills can be found in the Unit Resource Analysis (URA), BLM's Havre Resource Area.

Food habit studies of elk have not been conducted in the Sweet Grass Hills. Forage of the Missouri River Breaks is more similar to that of the Sweet Grass Hills than any other study area where food habits have been determined (Table 3.19). Important plant species utilized by elk in Montana are given in Table 3.20.

Elk and livestock compete for grass in the spring and fall in the Sweet Grass Hills. Indirect conflicts result as cattle use elk winter ranges. The competition may be slight due to the mobility of elk as is found in the Missouri River Breaks (Mackie, 1970). Studies are needed in the Sweet Grass Hills to determine the habitat, food habits and competitive factors associated with this elk population.

TABLE 3.20: IMPORTANT PLANT SPECIES UTILIZED BY ELK IN MONTANA [1.]

Grass [2.]	Forbs
Bluebunch wheatgrass	Common dandelion
Bluegrass	Lupine
Idaho fescue	Yellow sweetclover
Timothy	Salsify
Richardson's needlegrass	Ornica
Mountain brome	Arrowleaf balsamroot
Green needlegrass	Aster
Prairie junegrass	Common yarrow
Sandberg bluegrass	Pale agaseris
Western wheatgrass	Richardson's geranium
	Sticky geranium
Browse	Alfalfa
Big sagebrush	
Rose	
Snowberry	
Willow	
Common chokecherry	
Shrubby cinquefoil	
Silver sagebrush	
Quaking aspen	
Serviceberry	

1. From Smith, 1930; Kirsch, 1962; Mackie, 1965; Martinka. 1965; Stevens, 1965; and Knight, 1967.
2. Grass, forbs, and browse which are important in Montana elk studies and known to occur in the Sweet Grass Hills.

Upland Game Birds

SHARP-TAILED GROUSE

Sharp-tailed grouse are the most important upland game birds in the Prairie Potholes EIS area, having habitat of about 337,000 acres on public lands (Montana Department of Fish and Game, 1969). See Table 3.14. They are widely distributed through the grassland, grassland-shrub and woodland vegetation types that are associated with drainages in the EIS area. Populations fluctuate due to weather conditions but no trends have been noted (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication).

Yearlong residual cover is very important for the sharp-tailed grouse. Females nest and raise their broods in the grassy uplands usually within 1 mile of mating grounds. All nests are found within 2 miles of the mating ground (Sisson, 1976; Yde, 1977, and Neilsen, 1978). Brood rearing takes place in the same grassland area as nesting and, as long as cover is sufficient, the grouse will stay in the grassy uplands. If cover is not available, shrubby draws in the woodlands or shrubs on the uplands associated with the grassland-shrub type are used to rear the brood.

During the fall the hen and her brood use shrubs in the woody vegetation type for nesting during the heat of the day. They also feed in or close to shrubs during this period.

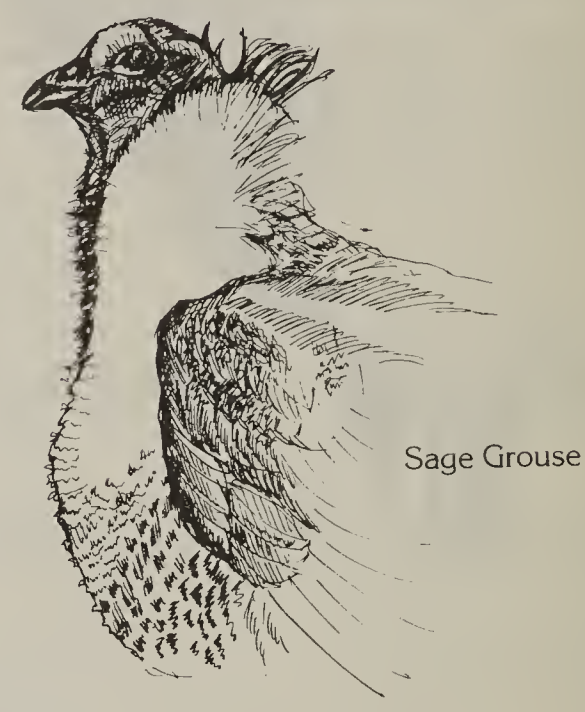
Buffaloberry, snowberry, juniper and wild rose in the woodlands are used extensively for food and cover by grouse during the winter. If snow is not available for burrowing during severe winter weather, shrubby vegetation must be available to protect the grouse population from heavy winter kills. Studies show that grouse may move some distance to find these shrubs (Neilsen, 1978).



Sharptailed Grouse

Other important plant species used by sharp-tailed grouse are alfalfa, clover, common chokecherry, common dandelion, pussytoes, rose, serviceberry and silver buffaloberry (Marshall, et al., 1937; Martin, et al., 1951, and Neilsen, 1978). Important feeding areas consist of grassland, grassland-shrub, riparian, woodland and agricultural types.

Sharp-tailed grouse and livestock indirectly compete for use of the woody vegetation in the drainages of the EIS area. These conflicts result as cattle trample and remove vegetation, reducing the quality of the yearlong habitat. Other indirect conflicts occur as foraging livestock remove grass in the vicinity of mating grounds that grouse use for nesting.



Sage Grouse

SAGE GROUSE

Sage grouse are the next most important game birds in the EIS area having about 395,000 acres of habitat on public lands (Table 3.14). They are primarily associated with the big and silver sagebrush communities in grassland-shrub and shrub vegetation types. Populations seem to be decreasing because of the continual reduction in habitat,principally due to expanding agriculture (Montana Department of Fish, Wildlife and Parks, 1979). Distribution of sage grouse in the area is illustrated on URA distribution maps in each BLM Resource Area Office.

Nesting habitat is located under sagebrush, usually within 2 miles of mating grounds (Wallestad and Pyrah, 1974; Martin, 1970, and Gill, 1965). The tallest and most robust sagebrush in the stand are normally used, ranging from 6.6-31.6 inches with canopy cover between 20-50 percent (Wallestad and Schladweiler, 1974, Wallestad and Pyrah, 1974).

Sage grouse prefer sagebrush for cover and food with a canopy cover greater than 15 percent. Sagebrush provides 80-100 percent of the sage grouse's winter diet (Wallestad, et al., 1975; Martin, 1970, Eng and Schladweiler, 1968). If snow covers low shrubs, sage grouse move to areas where shrubs are above the snow. Eng and Schladweiler (1972) and Wallestad (1975) reported that these winter areas contain shrubs that are at least 12 inches tall,usually within 2 miles of mating grounds. When this habitat is not available, sage grouse will move to areas where sufficient habitat exists.

RING-NECKED PHEASANTS

Public lands in the EIS area provide about 15,000 acres of ring-necked pheasant habitat (Table 3.14). Pheasants prefer areas where there are grain crops and weeds for food, and brush and trees (woodland and riparian) for cover (Janson, et al., 1971). Cattail and bulrush in wetlands also provide additional escape and winter cover for pheasants.

In the spring and summer green grasses and forbs provide food for the adult birds. Chicks eat insects during their first 4-6 weeks and then switch to vegetation. Small grains and weed seeds are used during the fall and winter.

Waterfowl

The Canada goose and 22 species of ducks are found in the EIS area (Appendix 3.10). In addition to the Canada goose, common nesting species are the mallard, pintail, blue-winged teal, green-winged teal, American wigeon, northern shovelers, lesser scaup and gadwalls.

The Prairie Potholes EIS area is part of the larger continental potholes region (300,000 square miles), the most important waterfowl producing area in North America (Smith, et al., 1964). In wet years this total area has the potential of producing over half of the annual duck population in North America while containing only 10 percent of the duck breeding area. Water is the limiting factor in duck production.

In the EIS area natural potholes, streams and the Milk and Marias Rivers provide nesting habitat for ducks and Canada geese. BLM has made a significant contribution to waterfowl production in the area by developing about 2,300 reservoirs which also provide nesting habitat for waterfowl. Manmade islands, especially important for Canada geese, have been built in about 15 percent of these reservoirs.

There are approximately 3,500 potholes and 186 miles of high value streams on public lands in the EIS area which supply nesting habitat. The average pothole and reservoir provide 5.2 and 3.0 acres of habitat, respectively. These bodies of water have the potential of producing approximately 34,800 ducks and 5,500 Canada geese on public lands in the EIS area annually. Waterfowl depend on cover in the upland area and on islands for nesting in the spring (Berg, 1956). Broods use emergent aquatic and shoreline vegetation for cover and food during the summer. Nesting and brood cover in the area are generally in very poor condition in the vicinity of all water where there is heavy use by livestock.

In Minnesota and eastern North and South Dakota, drainage of the potholes for agriculture has limited duck production. Conflicting legislation in these states has hampered the U. S. Fish and Wildlife's attempts to preserve natural wetlands. This is the reason public lands in northern Montana remain as a very important duck producing area in the United States,although the 1.75 million acres in the EIS area make up less than 1 percent of the potholes region of North America.



Canada Goose

Nongame Animals

Mink, beaver and muskrat are the principal fur bearers harvested in the area. All three are associated with water habitat. Predators that might be observed on public lands are the coyote, fox, weasel, badger, skunk, bobcat and raccoon. Other less common predators that may be present are the lynx, wolf and black-footed ferret. The latter two are on the endangered species list and are further discussed under that category in this section. See Appendix 3.10 for a species list of nongame animals in the EIS area.

Numerous nongame birds occupy various habitats on public lands. Some are specific to a particular habitat type with the highest densities occurring in riparian ecosystems (BLM, Nongame Studies, 1980). Almost all are seasonal and leave the area during winter. Species of special interest to the Montana Department of Fish, Wildlife and Parks (1979) are presented in Appendix 3.10.

Conflicts between nongame and livestock are discussed at the beginning of this section.

Invertebrates, (especially insects) are represented in the EIS area in large variety and abundance in the summer months but are generally fewer in the winter. Mollusks, snails, worms and aquatic insects are important in the food chain and are a major food source of fish, birds, small mammals, reptiles and amphibians.

There are presently 18 black-tailed prairie dog towns covering approximately 1,715 acres in the EIS area. Prairie dog towns provide habitat for more than 30 animal species. The burrowing owl and mountain plover, species of special concern of the Montana Department of Fish, Wildlife and Parks, (1979) are found in these towns. Potential habitat for the endangered black-footed ferret also exists in these towns.

Prairie dogs compete with livestock for forage. In the past prairie dog towns covered thousands of acres in the EIS area and were reduced or eliminated by local ranchers through control programs. Prairie dog expansion on public lands may seriously reduce the forage

available to livestock. In response to this concern, BLM in Montana has formulated a prairie dog policy statement (Appendix 3.12) which will guide prairie dog management on public lands in the EIS area.



Prairie Dog

Fisheries

All the perennial and some of the intermittent Milk River tributaries are used by cool water game fish as spawning and rearing areas in the lower reaches. These streams are important contributors to water quantity and quality as well. Since the Milk River is bordered by private lands, a discussion of its fishery is not undertaken in this EIS. Only 44 miles of three streams on public lands are known fisheries — Cutbank Creek (2 miles), the Marias River (18 miles) and Beaver Creek (24 miles).

Stream surveys were conducted during the 1979-80 field seasons on 186 miles of high value perennial and major intermittent streams. Fifty-one species of game and nongame fish occur in the EIS area (Appendix 3.10). Stream fisheries for trout are restricted to the westernmost portion of the EIS area in the Marias River and Cutbank Creek (see Map 5). The Milk River and major tributaries contain northern pike, channel catfish, burbot, largemouth bass, smallmouth bass, sauger and walleye. Nongame species found to be abundant and widespread in perennial and major intermittent streams include white sucker, lake chub, fathead minnow, brassy minnow, plains/silvery minnow, longnose dace and brook stickleback. One species, the finescale dace, has been designated a species of special concern by the Montana Department of Fish, Wildlife and Parks (1979). The finescale dace may be present in the upper reaches of Whitewater Creek in North Phillips County.

The 2 miles of public lands fishery habitat on Cutbank Creek is in good condition. Seventeen miles of the Marias River on public lands is in satisfactory condition. Twenty-four miles of Beaver Creek in south-central Phillips County flows through a Water and Power Resource Service withdrawal on which BLM administers the grazing. Beaver Creek supports a fishery for walleye and northern pike. Twenty-two miles (91 percent) of the reach of this stream is in unsatisfactory condition because of livestock grazing.

There are 27 livestock reservoirs that support fisheries on public lands in the EIS area. Rainbow trout have been stocked in 13 reservoirs while largemouth bass are found in 9. Photopoint studies have been conducted yearly since 1977 on eight reservoirs in BLM's Phillips Resource Area. Black crappie, channel catfish, yellow perch and brook trout are found in one reservoir each while northern pike are found in two (Table 3.21 and Map 4).

Game fish in reservoirs are stocked by the Montana Department of Fish, Wildlife and Parks. These reservoirs have widely varying populations as winter kills occur about every 4 years. Three or four years after restocking, these reservoirs provide outstanding recreation to anglers from the three or four-year classes of fish and the large rainbow trout (five pounds or more are common). Trout do not reproduce in these reservoirs and must be restocked periodically. Crappie will reproduce vigorously so restocking is not usually necessary unless there is a winter kill while brook trout and channel catfish may have limited reproductive capabilities. Brook trout and channel catfish have highly varying populations, depending on stocking, age class, growth rates and fishing pressure.

Livestock use is heavy near all but one fishing reservoir, PR 114, which is fenced. Photopoint studies in the Phillips Resource Area (BLM, 1980) have shown that current grazing management usually does not allow establishment of a good riparian zone or provide adequate bank protection from livestock trampling. Water quality is dramatically reduced in fishing reservoirs after livestock use.

Endangered and Threatened Species

Species listed as endangered and known to occur in the Prairie Potholes EIS area are the bald eagle, whooping crane, peregrine falcon and gray wolf. There were black-footed ferrets in the area at one time. They may still exist but none have been observed in the last 25 years.

There are no known or suspected breeding pairs of bald eagles in the Prairie Potholes EIS area. There are, however, about 25 birds which migrate through the area in the spring and fall. The Milk and Marias Rivers provide good habitat for these birds during migration. Birds have also been sighted in Assiniboine, Frenchman and Cottonwood Creeks.

Whooping cranes migrate through Medicine Lake National Wildlife Refuge during the spring and fall. No known or suspected breeding pairs of cranes inhabit the EIS area.

Peregrine falcons occasionally migrate through the area. A falcon was sighted in Phillips County in 1979. Five additional sightings (four in Phillips County and one in Valley County) were reported in the late fall of 1980. All sightings were of migrating birds.

TABLE 3.21 FISHERIES RESERVOIRS IN THE PRAIRIE POTHOLES EIS AREA

Reservoir Name	Fish Species	Township	Range	Section
Havre Resource Area Reservoirs				
Burns	Northern Pike	37 N.	19 E.	29
BR-12	Channel Catfish	34 N.	21 E.	18
BR-43	Rainbow Trout	33 N.	22 E.	24
Don	Rainbow Trout	36 N.	20 E.	15
North Faber	Rainbow Trout	33 N.	21 E.	21
Salmo	Rainbow Trout	33 N.	20 E.	18
South Cassidy	Largemouth Bass	34 N.	17 E.	22
Phillips Resource Area Reservoirs				
Compton	Rainbow Trout	37 N.	30 E.	33
Doucette	Rainbow Trout	31 N.	28 E.	26
PR-18	Largemouth Bass	25 N.	30 E.	5
PR-54	Largemouth Bass	37 N.	30 E.	17
PR-22	Rainbow Trout	36 N.	30 E.	13
PR-109A	Rainbow Trout	27 N.	33 E.	8
PR-114	Largemouth Bass	35 N.	33 E.	35
PR-16	Largemouth Bass	27 N.	26 E.	13
Valley Resource Area Reservoirs				
Creek	Black Crappie	29 N.	34 E.	19
Dix	Largemouth Bass	28 N.	38 E.	32
Fisher	Brook Trout	28 N.	35 E.	30
Gay	Rainbow Trout	33 N.	37 E.	2
Helen	Largemouth Bass	29 N.	34 E.	19
Hose	Rainbow Trout	33 N.	37 E.	17
Kong	Rainbow Trout	34 N.	36 E.	5
Langen	Largemouth Bass	33 N.	38 E.	26
Lunch	Largemouth Bass	27 N.	38 E.	2
Shoot	Rainbow Trout	28 N.	38 E.	10
VR-9	Rainbow Trout and Yellow Perch	31 N.	39 E.	13
Wards	Northern Pike	34 N.	39 E.	28

Gray wolves (suspected transients from Canada) have been reported in the Prairie Potholes EIS area. No critical habitat exists in the area though an occasional wolf is seen. Two wolves have been killed in Valley County, one in 1956 (Tomato Can Creek, 17 miles northwest of Nashua) and the other in 1978 (Buggy Creek, 24 miles northwest of Glasgow).

Habitat for the black-footed ferret exists on 18 black-tailed prairie dog towns covering 1,715 acres in the EIS area. No confirmed sightings of the ferret have been made.

RECREATION, WILDERNESS and VISUAL RESOURCES

Recreation

Hunting and fishing and recreational use of the Upper Missouri Wild and Scenic River Corridor (the only designated recreation area on public lands in the EIS area) are the most popular recreational activities in the Prairie Potholes EIS area (Table 3.22). Other recreation activities in the area include off-road vehicle (ORV) use (mainly associated with hunting and wildlife observation), varmint hunting (mainly for coyotes and prairie dogs), camping, hiking and snowmobiling.

Deer, antelope, waterfowl and upland game birds are distributed throughout the area and receive the major hunting pressure. There are both warm and cool water fisheries on public lands with trout, bass, perch and pike receiving most fishing attention. The primary fishing reservoirs on public lands in the EIS area are indicated on Map 5, *Map Supplement*.

TABLE 3.22: ANNUAL RECREATION USE

ACTIVITY OCCASIONS [1]	
Hunting	38,200 [2]
Fishing	115,000 [2]
Recreation Use (Permitted) Upper Missouri Wild and Scenic River	5,433 [3]

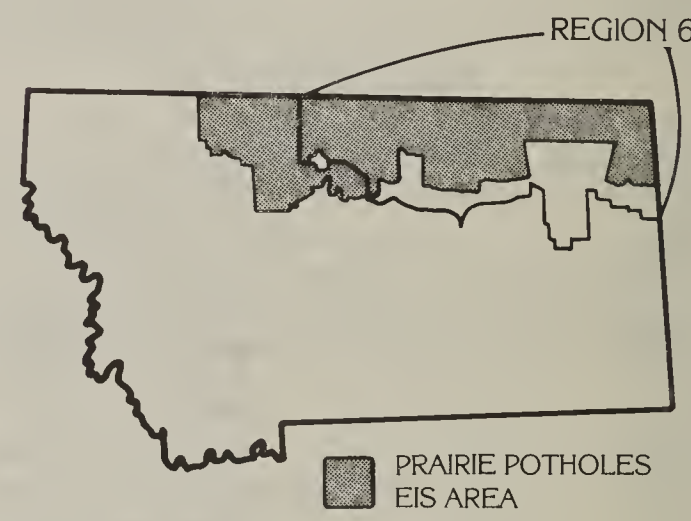
1. Participation during any part of a day.
2. Estimates from Montana Department of Fish, Wildlife, and Parks 1980 User Statistics.
3. Source, BLM.

The Missouri River is managed under the Upper Missouri Wild and Scenic River Plan from the BLM Lewistown District Office. Floatboating and associated camping and sightseeing occur in the EIS area along the 60 mile length of the river between Fort Benton and Eagle Butte. There are two primitive campsites located on public lands within the river corridor, accessible only from the river. Steamboat Point, a 30 acre tract, has recently been acquired for river access and day recreational use but has not been developed (Map 5). The river plan calls for developing six or more additional areas for primitive camping in the EIS area, the locations of which are yet to be determined. Since the river forms the southern boundary of the Prairie Potholes EIS area (Map 5),only impacts to the river and the land corridor north of the river will be considered in this EIS. Detailed information on recreational opportunities on the Missouri River are available from the River Manager at the BLM Lewistown District Office.



Table 3.22 shows annual estimates for hunting, fishing and river usage. Actual use for other recreational activities on public lands is unknown. Use figures for the Missouri River have been kept for the years 1979-1980 by BLM. The *Montana State Comprehensive Outdoor Recreation Plan* (SCORP) 1978, as well as updated figures obtained from the Montana Department of Fish, Wildlife and Parks,provided estimates for hunter and fisherman days. The Department of Fish, Wildlife and Park's Region Six boundaries are similar to the Prairie Potholes EIS boundaries so the hunting and fishing use figures are their's with slight modifications for the EIS area outside of their Region Six (Figure 3.11).

FIGURE 3.11: REGION 6 RECREATIONAL AREA



In *Design for Tomorrow, 1977-1990*, the Montana Department of Fish and Game projected a twofold increase in hunter days and a slight increase in fisherman days on public lands in Region Six between 1976 and 1990. As of 1978, 55 percent of the trout and 85 percent of other game fish in reservoirs or ponds as well as 8 percent of other game fish streams were located on public lands in the Region Six portion of the EIS area (SCORP, 1978). Forty-two percent of the mule deer, forty-six percent of the antelope and eight percent of the whitetail deer habitat are located on public lands in the EIS area. These figures show the extent to which hunters and fishermen presently rely on public lands for their recreation. The Montana Department of Community Affairs projected an increase in population in the EIS area from 82,585 in 1980 to 90,200 by 2000. Demand for recreation on public lands will probably increase from this larger population and the ever-decreasing access to private lands.

Wilderness

The wilderness inventory has been completed in accordance with Section 603 (a) of the Federal Land Policy and Management Act (FLPMA). One unit, Bittercreek, MT-064-356, has been made a Wilderness Study Area (WSA) from a total of 23 units intensively inventoried in the Prairie Potholes EIS area (see Map 5). The Bittercreek Unit possesses the necessary characteristics of size, naturalness and outstanding opportunity for solitude and/or primitive and unconfined recreation to qualify it for further study.

The Bittercreek Unit (Table 3.23) will be evaluated through the BLM planning process, considering all multiple-use values in determining its suitability for preservation as wilderness. Until the planning process is completed and a final determination on the wilderness suitability is made, Bittercreek will be managed under the *Interim Management Policy and Guidelines for Lands under Wilderness Review* (IMP) of December 12, 1979. The IMP states that the grazing use authorized during the 1976 grazing fee year is "grandfathered" and may continue. Range developments existing or under construction as of passage of FLPMA (October 22, 1976), may continue to be used and maintained. New range improvements and/or changes in grazing levels or seasons of use would be allowed only if the action is found to be non-impairing to wilderness suitability as defined in the IMP. To determine non-impairment, an environmental assessment on a case-by-case basis will be required for all proposed range developments or changes in grazing levels or seasons of use.

TABLE 3.23: WILDERNESS STUDY AREA

Unit Name	Unit Number	Acreage	Allotments Affected
Bittercreek	MT-064-356	59,112	4053, 4054, 4055, 4056, 4041, 4718, 4726



Visual Resources

Of the 15.5 million acres in the Prairie Potholes, 74.6 percent is rated as fair (Class C) scenery, while good (Class B) scenery comprises 22.6 percent of the area. The EIS area includes a 60 mile length of the Upper Missouri Wild and Scenic River. Most of the 2.8 percent of the excellent (Class A) scenery is located in this rugged river breaks area along with the Bears Paw Mountains south of Havre, the Sweet Grass Hills northwest of Havre and Frenchman and Rock Creeks northwest of Glasgow (BLM, 1979). Descriptions of how the scenery was rated in accordance with BLM Manual 8400 and how visual classes were determined are available in the BLM Lewistown District Office or in the Resource Area Offices in Malta, Havre or Glasgow.

Scenic quality is the most important aspect of the BLM Visual Class Management System. Scenic quality, sensitivity to changes to the landscape and visual accessibility are considered together in a matrix to determine which of five Visual Resource Management (VRM) Classes a particular geographic area falls into. Map 5 shows the location of the visual classes in the Prairie Potholes EIS area.

Class I areas are specially designated to limit management activity and maintain natural ecological and/or high scenic values. Only activities that won't attract attention are acceptable in these areas. The "Wild" portion of the Upper Missouri Wild and Scenic River Corridor is the only Class I VRM area in the Prairie Potholes EIS area, comprising 0.1 percent of the 1.75 million acres of public lands.

About 210,000 acres of public lands in the EIS area, or 12 percent, are rated as Class II. This is primarily land with good or excellent scenic quality. Changes in the basic scenic elements of line, form, color and texture can occur through management activity but no changes should be evident in the characteristic landscape. A contrast may be seen but should not attract attention.

About 56,000 acres of public lands, or 3.2 percent, are Class III. Changes in the basic scenic elements may be evident and may begin to attract attention but should not dominate the landscape in this VRM Class.

Approximately 1,482,250 acres of public lands, or 84.7 percent, are Class IV. Changes in the basic scenery may attract attention and can be a dominant feature. Management should attempt to blend the project with the present line, form, color and texture inherent in the characteristic landscape.

Class V areas are those where change is needed, either for rehabilitation or enhancement. At present, no Class V areas have been identified in the Prairie Potholes EIS area.

CULTURAL RESOURCES

The cultural environment of the Prairie Potholes EIS area includes the prehistoric and historic remnants of human residence during the past 12,000 years. Evidence of habitation, economic survival, social ceremony and art occur across the area.

Prehistoric sites are usually one of the few site types. More than 80 percent are either stone circle (tipi ring) sites or lithic scatters. The remaining sites are bison or other animal kill sites, associated cairns and stone alignments, other kinds of human habitation sites, rock art and burials. Animal kill sites are most numerous near major drainages where the topography provided opportunities to trap and kill herd animals.

Of the historic sites inventoried to date, the vast majority are abandoned homesteads. These are characterized by foundations or foundation pits, agricultural equipment, debris and structures occasionally left standing.



Because of the size of the Prairie Potholes EIS area (1,749,239 acres), a comprehensive survey to determine all historic and cultural properties that might be eligible for inclusion in the National Register of Historic Places is impossible. BLM has completed an existing data (Class I) inventory of the entire area, however, and identified no properties that are included in the National Register and fewer than 50 that appear to meet the criteria for inclusion in the National Register.

The cultural sites inventory for public lands in the area is approximately 10 percent completed. About 1,700 sites (most of which are prehistoric) have been recorded (Table 3.24). Available sampling inventory data on about 7 percent of the area indicates a density of about .01 sites per acre, or about 1 site per 100 acres. Site density varies, however, according to the general terrain and environment type.



TABLE 3.24: CULTURAL RESOURCES IN THE EIS AREA

Cultural Period	Cultural Evidence
Paleo-Indian (10,000 - 6,000 B.C.)	stone tools bone debris fossils
Early and Middle Plains Archaic (6,000 - 1,000 B.C.)	bison traps camp sites bone debris rock art
Late Plains Archaic (1,000 B.C. - 500 A.D.)	bison traps and pounds tipi rings stone tools fire-broken rock bone debris rock alignments rock art
Late Prehistoric (500 - 1,800 A.D.)	tipi rings cairns rock alignments buffalo jumps and kill sites rock art
Early Historic (1800 - 1890)	camp sites trading posts habitations mining remnants military sites other structures
Late Historic (1890 -)	mining remnants early ranching remnants homesteading remnants tools, equipment, debris schools, churches, cemeteries other structures

SOCIAL and ECONOMIC CONDITIONS

Introduction

Although the Prairie Potholes EIS area encompasses most of an 11 county region, 3 centrally located counties—Blaine, Phillips and Valley—contain about 94 percent of public lands. This description of social and economic conditions will therefore focus on these three counties plus Hill County because of its importance as a major trade and service center for the other three. These four counties are called the "Intensive Study Area" (Figure 3.12). The extreme southern portions of the counties in the intensive study area are outside the boundaries of the Prairie Potholes EIS area as they were included in the Missouri Breaks EIS (BLM, 1979). Data limitations prevent the subdivision of counties into smaller units which would more closely reflect the EIS boundaries.

The EIS area is a sparsely settled region (2.5 people per square mile) which exhibited fairly stable population characteristics during the 1970s (see Table 3.25). In the past, high levels of unemployment have been a problem in the area. Between the years 1960-70, sizeable population declines were recorded due to outmigration. Valley County experienced the greatest decrease in population during the 1960s (-33 percent), primarily due to the closure of the Glasgow Air Force Base.

In 1980 the entire EIS area contained 11 percent of Montana's total population while the intensive study area contained 5 percent. Projections for 1985 and 2000 have populations increasing gradually for both the EIS and intensive study areas. The population in the intensive study area is expected to increase 10 percent by the year 2000; Hill County is projected to increase 13 percent while slight decreases are expected in Blaine, Phillips and Valley Counties.

In the intensive study area the proportions of population classified as urban, rural and rural non-farm remained fairly steady during the years 1960-1980 (Table 3.25). The rural farm proportion increased from 1960-80 in the total EIS area. These figures do not indicate that rural farm population actually increased but that more people were lost from the urban and rural non-farm areas than from rural areas during the population decline. Thus, the rural areas appear to be maintaining their population in comparison to the urban areas.

Havre (in Hill County), with a 1980 population of 10,842, and Glasgow (Valley County), with a population of 4,458, are the major trade and service centers for the intensive study area. All other towns in the intensive study area have populations of under 2,500 people (Table 3.25). Havre grew by 3 percent during the decade 1970-80 while Glasgow lost 5 percent of its population during the same period.

FIGURE 3.12 SOCIAL and ECONOMIC EIS AREA

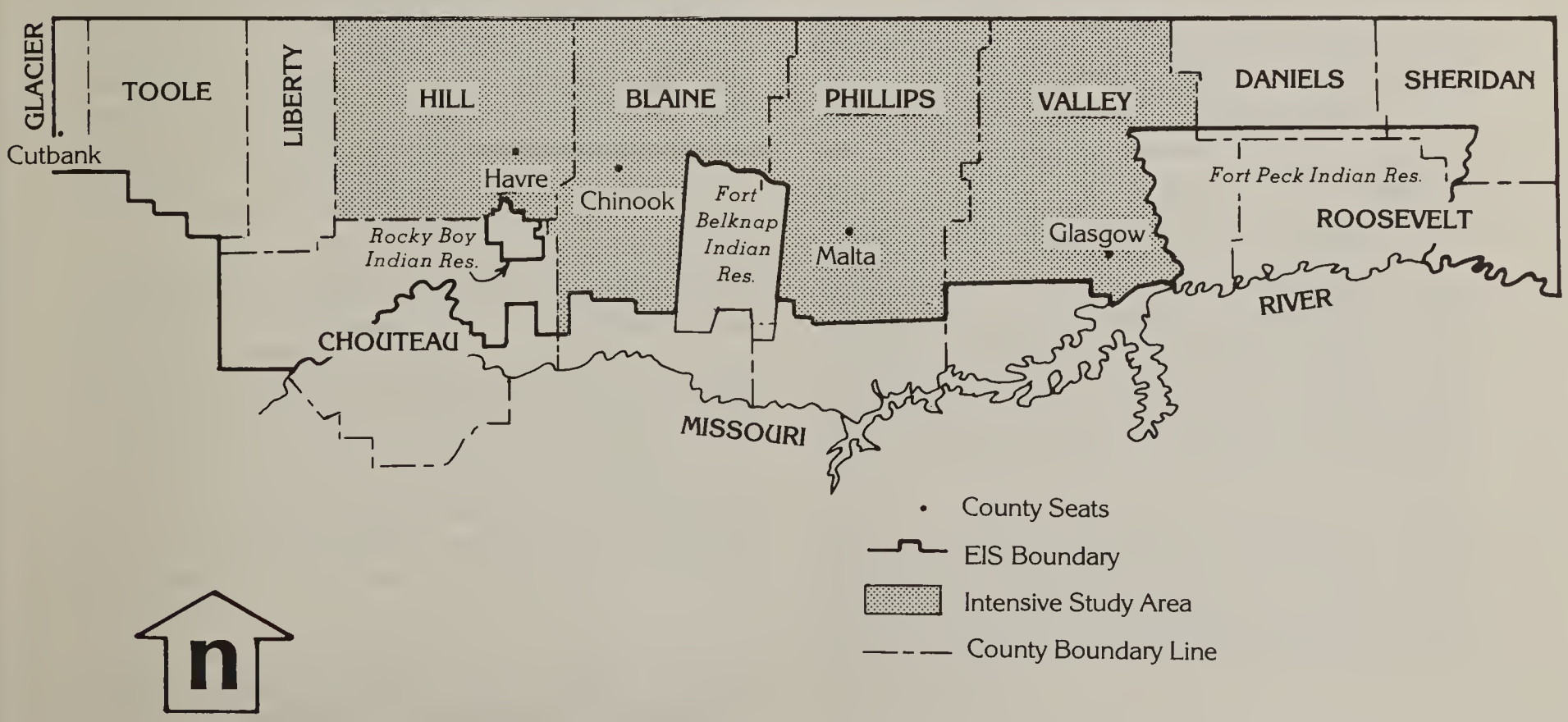


TABLE 3.25: POPULATION CHARACTERISTICS

	Intensive Study Area	Total EIS Area	State of Montana
1980 Population[4]	40,527	82,585	783,674
Population Change 1970–1980[4,5]	-1%	-4%	13%
Population Change 1960–1970[5]	-18%	-15%	3%
Net Migration Rate 1970–1977[5]	-1%	-4%	4%
Net Migration Rate 1960–1970[5]	-34%	-29%	-9%
Projected Population 1985[6]	43,700	88,000	823,100
Projected Population 2000[6]	44,800	90,200	935,600
Density (Persons Per Sq. Mi.) 1980[4]	2.3	2.5	5.3
Urban Population 1980[1,4]	38%	27%	-
Urban Population 1960[1,5]	34%	29%	-
Rural Non-Farm Population 1980[2,4]	12%	11%	-
Rural Non-Farm Population 1960[2,5]	14%	17%	-
Rural Farm Population 1980[3,4]	50%	62%	-
Rural Farm Population 1960[3,5]	52%	54%	-

Pop. of Incorporated Places of 1,000 persons or more (Intensive Study Area only) - Place and County	Havre (Hill),	Glasgow (Valley),	Malta (Phillips),	Chinook (Blaine),	Harlem (Blaine)
1980 Population[4]	10,842	4,458	2,365	1,662	1,010
Change 1970–1980[4,7]	3%	-5%	8%	-8%	-8%

Intensive Study Area includes: Hill, Blaine, Phillips, and Valley Counties.

Total EIS Area includes: Glacier, Toole, Liberty, Hill, Chouteau, Blaine, Phillips, Valley, Daniels, Sheridan, and Roosevelt Counties.

1. Urban classification includes incorporated communities of 2,500 or more population.
2. Rural Non-Farm includes incorporated communities of 1,000 to 2,500 population.
3. Rural Farm classification includes unincorporated communities of less than 1,000 and farms and ranches.

SOURCES:

4. Telephone conversation with Denver Regional Office, Census Bureau, U.S. Dept. Commerce, October 1980.
5. Socio-Economic Profiles of the Prairie Potholes Study Area, Abt. Associates, Inc., July 1979, pp 6-23.
6. Montana Population Projections, 1980–2000, Research & Information Systems Division, Dept. of Community Affairs, Helena, MT, July 1978, pp 4-6.
7. Population Estimates and Projections, Series P-25, No. 839, Census Bureau, U. S. Dept. Commerce, Nov. 79 pp 5-7.

Ranch Related Economic Conditions

RANCH OPERATIONS and RELATED INCOME

At the end of 1979 there were 6,012 ranches in the 11 county region and 2,438 located within the intensive study area (*Census of Agriculture*, USDC, 1980: the census definition for a farm/ranch is any establishment which had sales of agricultural products of $1,000 or more during the census year). There are currently 637 individual ranch operations with permits to graze public lands in the EIS area, 521 of which are in the intensive study area. In addition, many ranches are permitted to graze public lands through nine grazing associations. Where possible, the larger associations (those with over 500 BLM AUMs in their permits) have been divided according to share holdings and AUMs assigned to the individual operator; these operations are included in the 637 total. Operations included in the state grazing districts are permitted on an individual basis and are also included in the individual operations. (See Appendix 3.13).

Ranch operations with BLM permits comprise approximately 10 percent of the total ranches in the EIS area and 20 percent in the intensive study area. Seventy-nine of the six hundred and thirty-seven operations have permits for fewer than twenty-five BLM AUMs. The dependency of these operations on forage from public lands and the potential impact of grazing adjustments on their operations is not considered significant. Therefore, this analysis concentrates on the remaining 558 operations, 462 of which are in the intensive study area.

These 558 ranch operations were placed into 12 categories according to the numbers of livestock and the acres of cash crops raised. (See Table 3.26). Although there are a few operations that raise sheep and yearlings, the predominant type of ranch is a cow/calf operation. Substantial cash crops (primarily wheat) are raised on the majority. Where sheep, horses or yearlings are involved, the total number has been converted to equivalent cow units. Over 70 percent of the ranches fall into the 6 small and medium livestock categories, and over 75 percent grow medium or large sized acreages of cash crops.

Dependence of ranch operations on BLM forage is determined by a combination of several factors: the percentage of the total required forage that public lands provide, the seasons the forage is available and the availability of substitutes for this forage. The percentage is the primary indicator; Table 3.26 shows the average dependency according to ranch size categories. No ranch in the EIS area is more than 80 percent dependent on forage from public lands for its total grazing requirement and 147 (26 percent) are from 41-80 percent dependent. The average ranch is about 30 percent dependent.

The total number of families and the extent to which each is dependent on the net income from its ranch is difficult to determine. Almost all (over 98 percent) of the ranches are family operations and about one-third of the total have more than one family associated with the ranch. About one-fifth of the operations have at least one family member with outside employment. The smallest herd size category with no cash crops has a high percentage of outside employment (about 40 percent) and a low percentage of multi-family operations (about 10 percent). Otherwise, outside employment is distributed rather evenly throughout the other size categories. A very small number of ranches (2 percent) are operated by a hired manager with the owner being a professional or business person. These operators usually have no cash crops and fall into the small and medium livestock categories. The large and very large livestock operations tend to be family corporations with several families involved in multiple ranching and sometimes other business interests.

Table 3.27 shows that the 558 farms/ranches generate $18,896,542 annually in returns above cash cost and depreciation. This is the amount available to the operators and their families for their labor and management and their return to their equity capital. Forty-five percent of this ($8,576,322) is from the livestock portion of the operations. Total returns generated by the 462 farms/ranches in the intensive study area are $15,684,000 annually above cash costs and depreciation. Gross livestock sales from these 462 ranches is $29,945,000 and results in a gross output of $70,221,000. Returns per farm/ranch were estimated by formulating a budget for a representative farm/ranch for each of the 12 type and size categories (Appendix 3.13). Returns for each farm/ranch were then aggregated to determine total amounts.

On the basis of 1977-79 average prices, the representative farm/ranch in each size and type category earns enough income to at least cover cash costs and depreciation (Table 3.27). Returns of $2,846 annually for the small livestock/small cash crop operation are not enough to pay the operator minimal wages. Also there is no return to equity capital. As has been indicated, some of these ranch operators and their families are employed off the ranch to supplement their incomes. If they do not have off-ranch employment and the returns are not enough to cover family living expenses, then they usually allocate funds from the depreciation allowance, at least in the short run. If this happens, the operators must live with deteriorating equipment and without improvements and borrow on their equity when replacement becomes unavoidable.

Based on the ranch budgets (Appendix 3.13), it is estimated that the equivalent of one work year of hired labor is required for every 250 cows. Thus, livestock-related employment for the 558 farms/ranches in the EIS area is estimated to be the equivalent of 175 full time employees.

TABLE 3.26: ESTIMATED CURRENT DEPENDENCY OF RANCHES ON BLM GRAZING

Farm/Ranch Size Category	Ranches in Category #	Ranches in Category %	Avg. Herd Size (Cow Units)	Dependency 0-20%	21-40%	41-60%	61-80%	Avg. % Dependency
Small Livestock & Small Cash Crop								
(0-100 cows; 0-25 acres cash crops)	46	(08%)	60	15 (33%)	18 (39%)	10 (21%)	03 (06%)	29.7
Small Livestock & Medium Cash Crop								
(0-100 cows; 26-500 acres cash crop)	96	(17%)	60	38 (40%)	34 (36%)	13 (13%)	11 (11%)	31.0
Small Livestock & Large Cash Crop								
(0-100 cows; 500+ acres cash crops)	70	(13%)	60	27 (39%)	20 (29%)	13 (18%)	10 (15%)	30.9
Medium Livestock & Small Cash Crop								
(101-250 cows; 0-25 acres cash crops)	36	(06%)	170	18 (50%)	11 (30%)	06 (16%)	01 (03%)	24.2
Medium Livestock & Medium Cash Crop								
(101-250 cows; 26-500 acres cash crops)	88	(16%)	170	44 (50%)	23 (27%)	18 (21%)	03 (03%)	25.3
Medium Livestock & Large Cash Crop								
(101-250 cows; 500+ acres cash crops)	60	(11%)	170	36 (60%)	12 (20%)	11 (18%)	01 (02%)	21.2
Large Livestock & Small Cash Crop								
(251-499 cows; 0-25 acres cash crops)	32	(06%)	350	16 (50%)	02 (06%)	09 (29%)	05 (16%)	30.0
Large Livestock & Medium Cash Crop								
251-499 cows; 26-500 acres cash crops)	40	(07%)	350	13 (33%)	14 (35%)	10 (25%)	03 (08%)	30.7
Large Livestock & Large Cash Crop								
(251-499 cows; 500+ acres cash crops)	40	(07%)	350	21 (53%)	12 (30%)	03 (08%)	04 (11%)	24.6
Very Large Livestock & Small Cash Crop								
(500 or more cows; 0-25 acres cash crops)	18	(03%)	900	12 (66%)	04 (23%)	02 (12%)	00 (00%)	14.5
Very Large Livestock & Medium Cash Crop								
(500 or more cows; 26-500 acres cash crops)	12	(02%)	900	04 (34%)	04 (34%	03 (25%)	01 (08%)	29.8
Very Large Livestock & Large Cash Crop								
(500 or more cows: 500+ acres cash crops)	20	(04%)	900	08 (40%)	05 (25%)	04 (20%)	03 (15%)	32.5
Total	558	100%						

Sources: BLM, 1980; ASCS, 1980.

TABLE 3.27: ESTIMATED CURRENT RANCH INCOME BY RANCH SIZE

Farm Ranch Size Category	No. of Cows	No. of Acres of Cash Crop[1]	Average of BLM AUMS per Ranch	No. of Farms/ Ranches	Gross Sales Livestock Enterprise All Ranches	Returns above Cash Cost and Depreciation: Livestock Enterprises Average Per Ranch	Livestock Enterprise All Ranches	Cash Crop Enterprise Average Per Farm	Livestock Cash Crop Enterprise Average per Farm/Ranch	Total All Farms/ Ranches
Small Livestock Small Cash Crop[2]	0-100	0-25	159	46	$ 777,814	$ 2,846	$ 130,916	-	$ 2,846	$ 130,916
Small Livestock Medium Cash Crop	0-100	26-500	159	96	1,623,264	2,846	273,216	9,095	11,941	1,146,336
Small Livestock Large Cash Crop	0-100	500 or more	159	70	1,183,630	2,846	199,220	43,020	45,866	3,210,620
Medium Livestock Small Cash Crop[2]	101-250	0-25	382	36	1,730,952	10,662	383,832	-	10,662	383,832
Medium Livestock Medium Cash Crop	101-250	26-500	382	88	4,231,216	10,662	938,256	9,095	19,757	1,738,616
Medium Livestock Large Cash Crop	101-250	500 or more	382	60	2,884,920	10,662	639,720	43,020	53,682	3,220,920
Large Livestock Small Cash Crop[2]	251-499	0-25	982	32	3,146,624	24,501	784,032	-	24,501	784,032
Large Livestock Medium Cash Crop	251-499	26-500	982	40	3,933,280	24,501	980,040	9,095	33,596	1,343,840
Large Livestock Large Cash Crop	251-499	500 or more	982	40	3,933,280	24,501	980,040	43,020	67,521	2,700,840
Very Large Livestock Small Cash Crop[2]	500 or more	0-25	1972	18	4,548,096	65,341	1,176,138	-	65,341	1,176,138
Very Large Livestock Medium Cash Crop	500 or more	26-500	1972	12	3,032,064	65,341	784,092	9,095	74,436	893,232
Very Large Livestock Large Cash Crop	500 or more	500 or more	1972	20	5,053,440	65,341	1,306,820	43,020	108,361	2,167,220
		TOTAL		558	$36,078,580		$ 8,576,322			$18,896,542

1. Average acres harvested annually does not include summer fallow.
2. Most operations falling into this category actully have no cash crop. Thus, no figure is added under Cash Crop Enterprise, Average Per Farm.
Sources: BLM, 1980; ASCS, 1980.

PERMIT VALUE

The BLM does not recognize the right of the permittee to treat grazing permits as real property. These permits do have value, though, and are bought and sold in the marketplace and used as collateral for loans (McConnen, 1976). The value of the permits vary considerably. If the permit is for small isolated, landlocked tracts of public lands, then the value is minor. Where public lands provide a large block of grazing, the permit value can be substantial. Permit value is difficult to estimate because it usually is not separated from the total value of the ranch. Also, ranches are usually valued and sold on a cow-unit basis. Ranchers, BLM appraisers and the Federal Land Bank estimate that an average value for BLM grazing permits in the EIS area is approximately $100 per AUM or $1,200 per animal unit (Appendix 3.13).

As Table 3.28 shows, the total value for BLM grazing permits of the 558 farms/ranches under study in the EIS area is approximately $31,258,000. (The value of permits for operations with fewer than 25 BLM AUMs and some smaller grazing associations is not included in this figure.) The 20 very large livestock/large cash crop farms/ranches have the highest total permit value, $3,944,000.

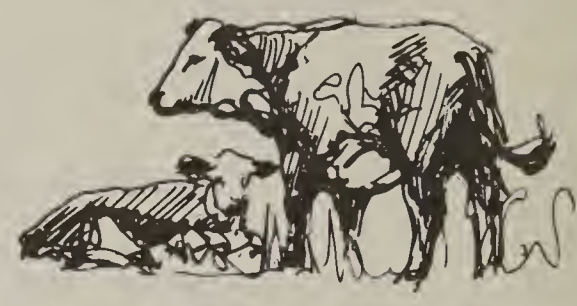


TABLE 3.28: ESTIMATED CURRENT PERMIT VALUE

Farm/Ranch Size Category	Average Number Cows	Number of Farms/ Ranches	Average[1] Permit Value per Ranch	Total Permit Value
Small Livestock Small Cash Crop	60	46	$ 15,900	$ 731,400
Small Livestock Medium Cash Crop	60	96	15,900	1,526,400
Small Livestock Large Cash Crop	60	70	15,900	1,113,000
Medium Livestock Small Cash Crop	170	36	38,200	1,375,200
Medium Livestock Medium Cash Crop	170	88	38,200	3,316,600
Medium Livestock Large Cash Crop	170	60	38,200	2,292,000
Large Livestock Small Cash Crop	350	32	98,200	3,142,400
Large Livestock Medium Cash Crop	350	40	98,200	3,928,000
Large Livestock Large Cash Crop	350	40	98,200	3,928,000
Very Large Livestock Small Cash Crop	900	18	197,200	3,549,600
Very Large Livestock Medium Cash Crop	900	12	197,200	2,366,400
Very Large Livestock Large Cash Crop	900	20	197,200	3,944,000
			TOTAL	$31,258,000

Source: BLM 1980

[1]Based on permit value of $100 per AUM

Recreation/Wildlife Related Economic Conditions

Due to data limitations, it is only possible to quantify the economic implications of hunting deer, antelope and waterfowl that use public lands. These economic implications fall into two categories. One is the value of the actual hunting experience the wildlife affords. This is the value that the recreationist would be "willing to pay" for the experience. However, since recreationists are not charged for hunting on public lands, there are no real dollar implications. The other category is the amount of dollars expended in the pursuit of hunting. It is estimated that big game hunting expenditures are $75 per day for non-residents and $29 per day for residents. It is also estimated that waterfowl hunting expenditures average $18 per day (Appendix 3.14).

The hunting of deer, antelope and waterfowl that use public lands generates about to $135,000 annually in direct expenditures (sales) in the intensive study area. These expenditures represent direct payments to sporting good stores, motels, service stations, packing and outfitting concerns and other services in the area that sell to recreationists. When indirect expenditures are added, the total expenditures amount to $277,000 annually which results in an increase in gross output of $91,000 (Appendix 3.14).

These expenditures result in about $36,000 annually in direct and indirect earnings to the intensive study area economy and are estimated to produce employment for the full time equivalent of 4 people (Appendix 3.14).

There are expenditures associated with prairie dog hunting, upland game bird hunting, fishing and wildlife observation but data is insufficient to estimate the dollar amounts.

Social Conditions

GENERAL ATTITUDES and PERCEPTIONS

The attitudes and perceptions of 72 people in the intensive study area were surveyed for BLM by a private contractor in January 1980 (Abt Associates, 1980a; see Appendix 3.15). The results of this study together with other information collected during public meetings and from the mailing of two brochures were used to develop the following.

The residents in this area exhibit attitudes and values typical of any rural, ranch-oriented society in the Western United States. The rural character of the area was mentioned most frequently when residents were asked what they valued about their lifestyle. Specific comments included an appreciation of the wide open spaces, naturalness, fresh air and solitude. The personal characteristics of the local people—friendliness, independence and industriousness—were frequently mentioned as positive aspects. The residents also valued the lifestyle offered by the local communities, mentioning such desirable qualities as everyone knowing everyone else, the lack of urban problems, relaxed pace, personal freedom and a good place to raise children. Not surprisingly, every respondent wanted to maintain the traditional land uses of the area in order to preserve this lifestyle.

Many residents contacted in the public involvement process or by the survey felt that the biggest threats to their lifestyle was government interference from overregulation, BLM interference with local ranches, wilderness designation, high taxes, inheritance taxes and diverting the use of public lands to wildlife or recreation. They would like to see land controlled at the local level and resent interference from outside the area, whether from agencies or interest groups. Thus, it can be concluded that any change in the status quo proposed by BLM would be viewed with alarm.

ATTITUDES TOWARD RESOURCES and MANAGEMENT

The survey of people in the intensive study area also revealed their attitudes toward vegetation conditions, allocations and BLM management of grazing. These findings were substantiated by information obtained through the public involvement process.

There was some agreement regarding range conditions and trend among the respondents. About two-thirds of these people felt range conditions were fair to good and improving. The remaining respondents viewed the range as overgrazed or in static condition. These varying perceptions may reflect the actual differences in range conditions found in various parts of the study area or differing views of range condition itself.

Nearly all respondents in the intensive study area indicated that the current balance of vegetation uses was appropriate and that good multiple use management had already been achieved. They felt there was adequate habitat for both game and nongame wildlife but were somewhat divided on the adequacy of watershed protection. These respondents stated that the balance was tipped toward livestock but felt this is appropriate because the area is economically dependent upon ranching. They indicated that actions such as instituting grazing systems, water development and range renovation should be undertaken to increase vegetation production and that these actions would in turn enhance all uses of rangeland.

A few respondents felt that more vegetation should be allocated for wildlife, waterfowl and/or recreation purposes. While sympathetic with the ranch families that are living off the land, these respondents felt that multiple use was not being practiced and that the balance should shift toward resources other than livestock grazing.

The majority of respondents from each county felt that BLM is generally doing a good job and is responsive to their needs. In each county, however, there was a smaller group that indicated that BLM was not respon-

sive. There was an indication of a lack of professional communication between local people and BLM personnel as some of the local people felt their expertise was not being used. Other frequently mentioned comments included: BLM is not flexible enough, BLM is not responsive in regard to proposed wilderness areas, BLM is caught up in too much "red tape" and is devoting too much time to nonrange management activities.

SOCIAL WELL-BEING

Table 3.29 presents objective indicators of social well-being for both the intensive study area and the total EIS area. These indicators present a mixed picture, suggesting the area possesses both the positive and negative factors associated with remote rural areas in general. The counties are lacking some basic services: the number of people per physician is much higher than for the state, education levels are slightly lower, the proportion of housing lacking some or all plumbing (a housing-quality indicator) is higher. Median family income is lower and the proportion of families below the national poverty level is high compared to the state as a whole. In addition, farms and ranches in the area are growing larger in size and fewer in number (Johnson, 1977 and Table 3.29). Also, unemployment has been a historic problem resulting in a loss of people in the working age group (18-64 years) because of the lack of opportunities for skilled employment. This problem was especially severe during the 1960s. After 1970, though, the area unemployment rates have been comparable to the state rates and out-migration has slowed to nearly equal in-migration.

Positive factors include the area's remoteness and sparse population which result in freedom from many urban problems, such as high crime rates and overcrowding. In addition, recreation opportunities are plentiful and family ranch operations remain predominant.

Regional Economic Conditions

EARNINGS and EMPLOYMENT

Figures for 1974-78 show agriculture and government as the main sources of employment and earnings for the intensive study area (Tables 3.30, 3.31 and Appendix 3.16). Retail trade, services, transportation and public utilities contribute the next largest portions of employment and earnings. These sources are concentrated in Hill and Valley Counties because Havre in Hill County and Glasgow in Valley County act as the major service and retail trade centers for the intensive study area. Blaine and Phillips Counties have higher proportions of agricultural employment and earnings.

Total earnings in the intensive study area increased by 10 percent from 1974-78 (Table 3.31). This is compared to a statewide increase of over 40 percent. Within the intensive study area, the large decrease in agricultural earnings offset the gains that were registered in most other sources. (It should be noted that agriculture earnings fluctuate a great deal from year to year due to weather and market prices.) All counties in the intensive study area registered growth in earning with Hill County being the highest at 13 percent.



Total employment in the intensive study area increased by 4 percent during 1974-78 as compared to the statewide increase of 14 percent. Several sources such as wholesale trade, retail trade, services and government showed sizeable growth while agriculture recorded a substantial reduction in employment. A much larger percentage of the wage and salary agricultural employment was lost as opposed to proprietory agricultural employment (35 percent versus 7 percent). Losses for these sources were nearly identical within each county. These losses in the agricultural sector reflect similar statewide and national trends and are due to increasing mechanization (Abt, 1980). Hill and Blaine Counties showed the highest overall growth rates in employment (11 percent each), while Valley showed a loss of 9 percent due to decreases in most sources.

Total employment and personal income projections (by source) for 1985 and 1990 were prepared for BLM during 1979 (Abt, 1979). Employment for the entire 11 county region is projected to increase very little by 1990, while income (in constant dollars) is projected to increase nearly 25 percent. Employment increases are smaller than projected population increases and may indicate the return of higher unemployment and resulting higher out-migration. The increases in personal income should enhance personal welfare among the employed inhabitants of the area. Employment within agriculture is projected to decline during this period, while employment in the mining, manufacturing, trade and service sources is expected to increase.

PUBLIC FINANCE

It is estimated that $553,000 was paid in 1978 in property taxes for livestock on the 462 farms/ranches using public lands in the intensive study area. This figure is based on an estimated assessed valuation of $34,600,000. The total assessed valuation for cattle in Hill, Blaine, Phillips and Valley Counties was about $51,200,000 in 1978 (Montana Department of Revenue, 1978). Thus, assessed valuation of livestock on farms/ranches using public lands is approximately 68 percent of the total assessed valuation for cattle in the intensive study area.

TABLE 3.29: SOCIAL WELL-BEING

	Intensive Study Area	Total Study Area	State of Montana
Population Aged 17 or Less (%) 1970[3]	38.8	39.4	36.4
Population Aged 18 to 64 (%) 1970[3]	51.6	50.8	53.7
Population Aged 65 or More (%) 1970[3]	9.6	9.8	9.9
Population Completing at Least 4 Yr. H.S. (%) 1970[4]	55.9	54.6	59.2
Persons Per Physician 1973[4]	1,412	1,056	843
Crime Rate Per 100,000 Pop., 1978[1,2,5]	2,228.1	1,722.8	3,980.4
Median Family Income ($) 1969[2,6]	7,781	8,080	8,509
Family Income Below the Poverty Level (%) 1969[2,6]	15.9	13.2	10.4
Unemployment Rate 1978[2,3]	6.0	5.2	6.0
Housing Lacking Some or All Plumbing Facilities (%) 1977[2,6]	9.8	8.7	5.6
Change in Number of Farms and Ranches (%) 1969-1978[2,7]	-4.9	-6.1	
Change in Average Size Farms and Ranches (%) 1969-1978[2,7]	+12.6	+10.2	

Intensive Study Area includes Hill, Blaine, Phillips and Valley Counties.
Total Study Area includes Glacier, Toole, Liberty, Hill, Chouteau, Blaine, Phillips, Valley, Daniels, Sheridan and Roosevelt Counties.

1. Includes the 7 major crimes: aggravated assault, robbery, burglary, grand theft, rape, homicide and theft.
2. Figure is an average of the individual county figures.

Sources:

3. Social-Economic Profiles of the Prairie Potholes Study Area, Abt. Associates, Inc., July 1979, pp 6-23.
4. Social-Economic Profile, Montana State Office, 1975, Bureau of Land Management, Vol. 1, p 23; Vol. 2, p 23.
5. Crime in Montana, 1978, Annual Report of the Criminal Justice Data Center of Montana, MT Board of Crime Control, 1979, p 13.
6. County and City Data Book, 1977, U.S. Dept. of Commerce, Bureau of Census, 1978, pp 282-299.
7. Census of Agriculture, U.S. Dept. of Commerce, Bureau of Census, 1977 & 1980.

TABLE 3.30: INTENSIVE STUDY AREA EMPLOYMENT BY SOURCE FOR 1974-1978 (NUMBER AND PERCENT OF TOTAL)

	1974		1975		1976		1977		1978		Change 74-78
SOURCE	#	%	#	%	#	%	#	%	#	%	%
PROPRIETORS											
AGRICULTURE	2,757	14.7	2,860	15.3	2,673	14.4	2,619	14.0	2,564	13.1	-7.0
NON-AGRICULTURE	1,426	7.6	1,434	7.7	1,453	7.8	1,500	8.0	1,606	8.2	12.6
WAGE & SALARY											
AGRICULTURE	1,237	6.6	1,046	5.6	951	5.1	799	4.3	808	4.1	-34.7
AG. SERV., FOR. FISH & OTHER	161	0.9	100[1]	0.5[2]	123[1]	0.7[2]	176	0.9	162[1]	0.8[2]	9.3[3]
MINING	101	0.5	65[1]	0.3[2]	45	0.2	51	0.3	93[1]	0.5[2]	-7.9[4]
CONSTRUCTION	763	4.1	699	3.7	691	3.7	719	3.8	660	3.4	-13.5
MANUFACTURING	530	2.8	477	2.6	471	2.5	468	2.5	433	2.2	-18.3
TRANS. & PUBLIC UTILITIES	1,463	7.8	1,396	7.5	1,485	8.0	1,517	8.1	1,511	7.7	3.3
WHOLESALE TRADE	519	2.8	785	4.2	786	4.2	815	4.3	832	4.3	60.3
RETAIL TRADE	2,498	13.4	2,411	12.9	2,550	13.7	2,586	13.8	2,687	13.8	7.6
FINAN. INS. & REAL ESTATE	416	2.2	437	2.3	447	2.4	483	2.6	547	2.8	31.5
SERVICES	2,829	15.1	2,532[1]	13.5[2]	2,686[1]	14.4[2]	3,068	16.4	3,240	16.6	14.4
GOVERNMENT[5]	4,006	21.4	3,997	21.4	3,711	19.9	3,961	21.1	4,304	22.0	7.4
TOTAL	18,706	100.0	18,704	100.0	18,615	100.0	18,762	100.0	19,520	100.0	4.4

The Intensive Study Area includes Hill, Blaine, Phillips, and Valley Counties.

1. Data for one county is missing because it was not disclosed; thus study area total for that sector is underestimated. Missing data is included in the yearly totals.
2. Percent is underestimated because of missing information (see 1).
3. Percent is calculated for 1974 to 1977 because data for 1978 are incomplete.
4. Percent is questionable because 1978 figure is underestimated (see 1).
5. Figure includes local, state and Federal government employees.
   Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1980.

TABLE 3.31: INTENSIVE STUDY AREA EARNINGS BY SOURCE FOR 1974-1978 (THOUSANDS OF DOLLARS) (NUMBER AND PERCENT OF TOTAL)

	1974		1975		1976		1977		1978		Change 74-78
SOURCE	#	%	#	%	#	%	#	%	#	%	%
AGRICULTURE	59,739	33.0	61,848	31.6	27,295	16.2	-5,876	-4.0	30,383	15.2	-49.1
AG. SER. FORESTRY, FISHERIES & OTHER	1,086	0.6	755[1]	0.4[2]	737[1]	0.4[2]	1,265	0.9	1,185[1]	0.6[2]	16.5[3]
MINING	2,083	1.1	1,248	0.6	1,103	0.7	1,083	0.7	1,697[1]	0.8[2]	-18.5[4]
CONSTRUCTION	12,112	6.7	12,301	6.3	12,692	7.5	14,112	9.6	14,032	7.0	15.9
MANUFACTURING	4,433	2.4	4,617	2.4	4,567	2.7	4,954	3.4	5,185	2.6	17.0
TRANS. & PUBLIC UTIL.	19,934	11.0	21,318	10.9	25,238	15.0	28,513	19.3	31,054	15.5	55.8
WHOLESALE TRADE	6,548	3.6	9,343	4.8	9,834	5.8	10,131	6.9	11,399	5.7	74.1
RETAIL TRADE	19,673	10.9	19,856	10.2	20,522	12.2	21,316	14.4	23,732	11.9	20.6
FINANCE INSUR. & REAL ESTATE	3,957	2.2	4,273	2.2	5,393	3.2	6,908	4.7	7,869	3.9	98.9
SERVICES	22,103	12.2	23,556[1]	12.1[2]	25,627[1]	15.2[2]	29,012	19.6	32,781	16.4	48.3
GOVERNMENT[5]	29,628	16.3	33,493	17.1	32,049	19.0	36,325	24.6	40,068	20.0	35.2
TOTAL	181,296	100.0	195,432	100.0	168,522	100.0	147,753	100.0	200,013	100.00	10.3

The Intensive Study Area includes Hill, Blaine, Phillips and Valley Counties.
Earnings include wages, salaries and proprietors' income.

1. Data for one county is missing because it was not disclosed; thus study area total for that sector is underestimated. Missing data is included in the yearly totals.
2. Percent is underestimated because of missing information (see 1).
3. Percent is calculated for 1974 to 1977 because data for 1978 are incomplete.
4. Percent is questionable because 1978 figure is underestimated (see 1).
5. Figure includes local, state and Federal government employees.
   Source: U.S. Department of Commerce, Bureau of Economic Analysis, 1980.

CHAPTER 4

ENVIRONMENTAL CONSEQUENCES

INTRODUCTION

This chapter explains the environmental consequences of the six alternatives discussed in Chapter 2. Environmental aspects are analyzed to determine the affect of each proposal or combination of proposals of an alternative. Consequences are usually dependent on an action of some kind but there also are consequences that would occur if an action is foregone. "Climate and Air Quality" and "Geology" were not analyzed since it has been determined that these components would not be significantly affected by any of the alternatives. They are therefore dropped from further discussion.

Chapter 4 is divided into two sections: "General Impacts" and impacts by alternative. General impacts are those that would have a common impact to the particular environmental component in each alternative. This section explains how the proposals in an alternative would affect the environment, what the impacts would be, how it is known the impacts would occur and how the impacts were quantified. The impacts by alternative section quantifies specific impacts (where possible), discusses where the impacts would occur, how much of the environmental component would be affected and what the significance of the impact would be.

The following assumptions have been made in this chapter:

1. BLM would have the funding and staff to implement, monitor and make revisions in AMPs as necessary.

2. BLM would receive sufficient funding to maintain present and new developments.

3. All range improvements, grazing systems and land treatments would be implemented in 1988, seven years from the beginning of the implementation in 1982.

4. Short term impacts are those which would occur during AMP implementation (1982 through 1988). Long term impacts are those following 15 years of AMP implementation (approximately by the year 2003).

5. Newly implemented grazing systems would be adhered to through one complete cycle at least. Unauthorized livestock use would be strictly controlled and would not be a significant impact causing agent.

6. BLM would verify the level of impacts and monitor the AMPs to make necessary adjustments in plans that are not meeting the desired multiple use objectives.

7. The principle resource directly affected is vegetation. Any changes in production, condition trend or composition of vegetation would affect other resources.

8. Each alternative is analyzed as if it would be fully implemented as described in Chapter 2.

Irretrievable and irreversible commitments of human resources, materials, fossil fuels and money would be made in all of the alternatives. This commitment would be governed by whether an alternative was fully or partially implemented. Some idea of the total implementation costs can be realized by the dollar amounts listed in Chapter 2 which include manpower, material and, to a degree, full expenditures.

GENERAL IMPACTS

Watershed

Groundwater resources would be unaffected by any alternative and will not be discussed further.

Sediment yield and water yield calculations were used to predict how various livestock management techniques would affect watershed. It has been assumed that water quality directly relates to changes in sediment and water yields. Projected yields were calculated from a range of current yields from reservoir sediment surveys conducted by BLM in the EIS area during 1979-80 (Table 3.6 and Figure 3.4). Soil subgroups were determined for watershed areas above each surveyed reservoir and aggregated into four groups, each having similar erosion and water yield characteristics. Table 3.6 represents the scope of both sediment and water yields in the EIS area. This scope was used to compute the initial yields and predict how sediment and water yields would change in the long term when affected by grazing and land treatments, range facilities, water developments and chemical treatments of noxious weeds and prairie dogs. The method used to calculate initial and long term sediment and water yields is discussed in the following sections. The results of management changes are quantified in each alternative.

Proper management of livestock grazing is necessary to maintain production of desirable rangeland

vegetation (Hormay, 1975). This includes proper livestock distribution, seasons of use and stocking rates to reduce the effects of livestock concentrations on floodplains, footslopes, fans and around reservoirs (Hormay, 1975; Ryerson and Houlton, 1980; Holechek, 1980 and Smeins, 1975). Concentrations of livestock lead to the overuse of vegetation and soil compaction in the areas mentioned above (Rauzi and Hanson, 1966; Gifford, 1975; Holechek, 1980 and Smeins, 1975). According to BLM soil inventories (1980), the potential for soil compaction on floodplains, footslopes and fans (soil subgroups 6, 10, 11, 12, 13 and 17) is high. Removal of vegetation and soil compaction by livestock decreases water infiltration and increases both sediment and water yields (Rauzi and Hanson, 1966 and Holechek, 1980). Sediment yield is highest on soil subgroups 3, 4, 10, 11, 13 and 16; water yield is highest on soil subgroups 2, 3, 4, 10, 11, 12, 13 and 16 (BLM, 1980). Water quality is reduced by increased sediment and water yields because concentrations of suspended sediment, nutrients and fecal bacteria in surface waters are increased (EPA, 1979; Holechek, 1980; Smeins, 1975 and Johnson, Gary and Ponce, 1978).

Proper distribution of livestock would improve ecological range condition by maintaining vegetation cover and soil stability and productivity (Dyksterhius, 1951 and Lodge and Campbell, 1965). Since this is rarely achieved over an entire allotment, livestock concentrations occur. Adequately designed grazing treatments can reduce problems caused by livestock concentrations.

Maintaining or improving watershed resources can be accomplished almost entirely by the timely resting of the range (Hormay, 1970). Grazing systems that provide periodic rest or deferment for the phenological development of plants maintain adequate vegetation cover and plant productivity (Cook, 1966; Hormay, 1970 and Table 3.8) while resulting in improved water quality, less soil compaction and streambank sloughing (Holechek, 1980). According to BLM soil inventories (1979), rest and deferment treatments would result in the greatest vegetation response on clayey and overflow range sites (soil subgroups 3, 4, 6, 10, 16 and 17). The least response would occur on claypan and dense clay range sites dominated by clubmoss and blue grama (soil subgroups 2, 11 and 13). Floodplain and riparian zones (soil subgroups 6 and 17) would benefit from the deferment of livestock use during wet soil conditions in the spring (Holechek, 1980).

Initial sediment and water yields were calculated by averaging the mean value of each soil subgroup aggregation (Figure 3.4), multiplied by the total acreage in AMP and proposed AMP status (Table 2.1) for each alternative. Predicted yields for the long term were computed by using areally averaged sediment and water yields multiplied by acres affected in each alternative.

Exclusion of livestock from selected riparian zones for 4-10 years followed by rotational grazing treatments of rest and deferment would increase the vigor of all riparian vegetation. Increased riparian vegetation cover would help stabilize stream banks and channels, resisting erosion and slowing water velocity, improving water quality by reducing suspended sediment and fecal bacteria and lowering water temperatures by providing shade (Holechek, 1980). Excluding livestock from fisheries reservoirs by fencing would improve water quality (Holechek, 1980) and increased vegetation cover would lessen sediment loading and prolong the useful life of these reservoirs. Fencing would also prevent erosion of shorelines and dams caused by livestock trampling and trailing.

Saline seeps below reservoir dams occur in any of the soil subgroups that were developed on glacial till or derived from marine sediment rich in salt content (Brown and Ferguson, 1976 and Bahls and Miller, 1976).

Excluding livestock from saline seeps for 4-10 years followed by rotational grazing treatments of rest and deferment would allow the establishment or improvement of wetland type vegetation such as willows, cottonwood and creeping foxtail (Batz, 1976, Stroh et al., 1978 and Krall, 1976). Use of seep water by plants would reduce salt accretion from the evaporation of water that is somewhat saline in many cases (Ferguson, 1976 and Bahls and Miller, 1976). Salt accumulation reduces water quality and decreases soil productivity (Bahls and Miller, 1976 and Krall, 1976).

For calculating the effects of exclosures, the assumption was made that sediment and water yields would be low to medium for soil subgroups 6 and 17. Initial yield rates were obtained by multiplying the median sediment and water yields by the proposed acreage of the exclosure by the mean of the lowest sediment and water yields. This gave a predicted value for the effects of fencing in the long term.

Range vegetation production can be increased by mechanical treatments of native or introduced plant species (EPA, 1979 and Branson, et al., 1962). Mechanical treatments would disturb anywhere from 40-100 percent of the soil surface, causing a temporary lowering of vegetation production. Production rapidly increases the first year after treatment (Ryerson and Houlton, 1980), however. Mechanical treatments (with 1½ to 2 years rest following treatment) would improve plant vigor and production, increase infiltration and lower sediment and water yields (Ryerson, and Houlton, 1980).

Mechanical treatments expose large areas of bare soil to erosion initially but greater vegetation cover after the first year lowers runoff and erosion. Pits and furrows also collect rainfall, helping prevent erosion (Wight and Siddoway, 1972). Almost all precipitation falling on

mechanically treated range, especially furrowed and scalped areas, remains onsite unless the water storage capacity of the treated area is exceeded (Gifford, 1975). Mechanically treated areas could even store the precipitation of an extreme storm, the kind that would occur only once every 500 years (Don Ryerson, 1981, BLM, Personal Communication). The water yield from mechanically treated areas to offsite reservoirs and streams is eliminated if precipitation is less than the water storage capacity, so proper care must be exercised in the location of mechanical treatments. Otherwise, livestock reservoirs might not receive enough runoff to last through a grazing season (Ryerson and Houlton, 1980).

Conversion of native short-grass range to midgrass, and nearly level ground surfaces to ridges and furrows by mechanical treatments increases the capacity of the soil surface to trap snow. Greater surface storage of snowfall provides additional water when the snow melts (Saulmon, 1973 and Neff and Wight, 1977). Ponding in the furrows allows more time for the water to infiltrate the soil and recharge the soil moisture (Wight and Siddoway, 1972 and USDA, ARS, 1974). In a study by Neff (1980), each additional millimeter of available soil water in the spring increased forage production by 6 pounds/acre. Vegetation responses, both in yield and composition, are directly related to higher soil moisture retention and higher rates of nutrient cycling (Ryerson and Houlton, 1980).

Mechanical treatments would be most effective in reducing clubmoss (Ryerson and Houlton, 1980 and Willard and Herman, 1977). In heavy storms, the runoff from clubmoss-blue grama areas is excessive, causing offsite erosion. Planting with native or introduced species after mechanical treatments would provide a vegetation cover that improves, rather than impedes, infiltration.

Initial sediment and water yields were calculated by multiplying the acres to receive treatment by the median areally averaged current sediment and water yields for soil subgroups, 1, 2, 5 and 12 (Figure 3.4). Long term yields are assumed to be zero since runoff and erosion from mechanically treated acres would not occur unless precipitation exceeded the onsite storage capacity of the soil.

Range facilities would improve livestock distribution for more uniform forage use. Livestock would still concentrate, especially in floodplain and riparian zones (soil subgroups 6 and 17) but the greater number of facilities would dissipate the overall effect to include upland areas and allow watershed conditions to stabilize or improve (Vallentine, 1971).

Observation of the current AMP allotments indicates that the construction of livestock management fences causes temporary soil and vegetation disturbances from compaction by vehicles and vegetation removal from the excavations for posts and cattle guards but disturbed areas return to their natural condition without adverse impacts. Livestock trailing and grazing along fence lines afterwards does remove vegetation, resulting in increased runoff and erosion.

Sediment and water yields from the development of range facilities are limited to the prediction of yields due to fencing. A soil disturbance 1.5 feet wide multiplied by the miles of fence gives the acreages of soil disturbance by alternative for the EIS area. Median sediment and water yields from Figure 3.4 were used to determine initial yields by multiplying median values by the number of affected acres. Long term yields were obtained by using the areal highest mean sediment and water yields for each aggregation of soil subgroups, multiplied by the total soil disturbance area for each alternative.

Sediment yield to reservoirs results from the erosion of dams and shorelines. Livestock use near unfenced reservoirs increases the sediment yield , decreasing the water storage capacity (Table 4.1) and the water quality by increasing suspended sediment concentrations, turbidity and water temperature (Holechek, 1980). A study of reservoirs in the EIS area (BLM, 1980) indicates that reservoirs presently trap between 84-100 percent of all sediment found in them (Table 4.1). Reservoirs can be constructed on any of the 19 soil subgroups but those constructed in soil subgroups 3 and 4 would be subject to heavy sediment loading, reducing the useful water storage capacity significantly after approximately 10 years.

Development of water facilities results in soil surface disturbance to 3 acres per reservoir; 2 acres, however, would be located upstream of the dam and would not contribute to downstream sediment yield. Observations in the EIS area show that the 1 acre of disturbed soil on dams and borrow areas contributes an insignificant amount of sediment to downstream stream channels.

Based on observations on current AMP allotments, water facilities allow livestock to graze areas that were ungrazed or lightly grazed before water development. In the long term development of upland water sources in combination with grazing treatments and more uniform use of upland forage would result in less grazing pressure on floodplain and riparian vegetation.

Sediment and water yield changes from water developments were considered insignificant. Reservoirs are sediment traps with erosion and runoff occurring only from the dam and contributing minor amounts of sediment to drainages below reservoirs.

Control of leafy spurge and other noxious weeds is important to watershed resources because infestations on public lands would increase from 2,200 acres to 5,280 acres without control as weeds out compete native range plants. Loss of AUMs in the long term in high productive areas (soil subgroups 6, 7, 9, 10, 17 and 19, where weeds grow vigorously) forces livestock

TABLE 4.1 : RESERVOIR TRAP EFFICIENCY

Reservoir Name	Date Constructed	Age Years	Designed Water Storage Capacity (AC-FT)[1]	Existing Sediment Volume in Reservoir (AC-FT)	Existing Water Storage Capacity (AC-FT)[2]	Percent of Sediment Trapped (AC-FT)	Reservoir Sediment Yield (AC-FT/MI^2/YR)[3]
Andy	1968	12	13.31	3.91	9.40	100	0.35
Multiple	1935	45	9.81	4.11	5.70	98	0.42
PR-309	1947	33	2.44	1.09	1.35	94	0.46
Teal	1936	44	111.91	16.15	95.76	100	9.44
Wild Goose	1945	35	8.16	2.73	5.44	99	1.49
BR-19	1936	44	38.93	9.19	29.74	98	0.11
Vin	1969	11	3.13	0.95	2.18	100	1.26
Buckley	1950	30	17.35	5.96	11.40	100	2.73
BR-6	1936	44	4.33	1.44	2.89	96	0.10
Bend	1966	14	2.52	0.40	2.12	100	1.23
Six	1966	14	0.88	0.15	0.73	96	0.30
BR-104	1960	20	3.21	1.06	2.15	97	0.32
Nesslar	1948	32	25.49	6.96	18.53	100	0.49
Homestead	1964	16	8.83	2.46	6.37	100	1.29
Jan	1972	8	2.68	0.93	1.75	84	1.57
Squite	1969	11	5.01	1.81	3.21	91	2.26
Brown	1967	13	1.77	0.58	1.19	90	0.99
Half	1950	30	12.79	4.04	8.75	93	0.61
Crappie	1967	13	2.16	0.70	1.46	84	0.85
Glut	1967	13	3.84	1.36	2.48	95	2.49
Junction	1963	17	9.29	2.44	6.85	91	1.00
Ripe	1957	23	8.33	1.17	7.16	99	0.23
VR-130	1948	32	5.99	1.75	4.24	99	0.35
VR-159	1948	32	22.13	8.38	13.74	98	0.27
Marlys	1963	17	15.87	4.16	11.71	93	2.48
Bean	1971	9	2.56	0.84	1.72	86	0.96

1. AC-FT = Acre feet.
2. Design water storage capacity minus existing sediment volume in reservoir.
3. AC-FT/MI^2/YR = Acre feet per square mile per year.

SOURCE: USDI, BLM, 1980, Inventory Report; Sediment and Water Yields; Unpublished.

to graze more intensely on nearby non-infested areas. This causes reduced vegetation cover and increased sediment and water yields from the heavily grazed areas (Noble, et al., 1979).

To predict initial sediment and water yields, the acres infested with noxious weeds were multiplied by current areally averaged sediment and water yields (Figure 3.4). Elimination of noxious weeds would cause decreased grazing pressure on nearby vegetation. Less grazing pressure would result in decreased sediment and water yields. Therefore the areal mean of the lowest yields from Figure 3.4 were multiplied by the acres of noxious weeds eliminated to predict long term changes in sediment and water yields.

Chemical control of prairie dogs would reduce the size of the present prairie dog towns. A BLM inventory (1979) revealed that prairie dog towns are found mostly in soil subgroups 1, 2, 9, 10, 11 and 12, where vegetation is dominately short grasses, forbs, shrubs and clubmoss. When the range is in poor or fair ecological range condition because of livestock concentrations, prairie dog towns develop and spread (Craig Knowles, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication). Prairie dogs and continued livestock grazing reduce vegetation cover, resulting in accelerated runoff and erosion.

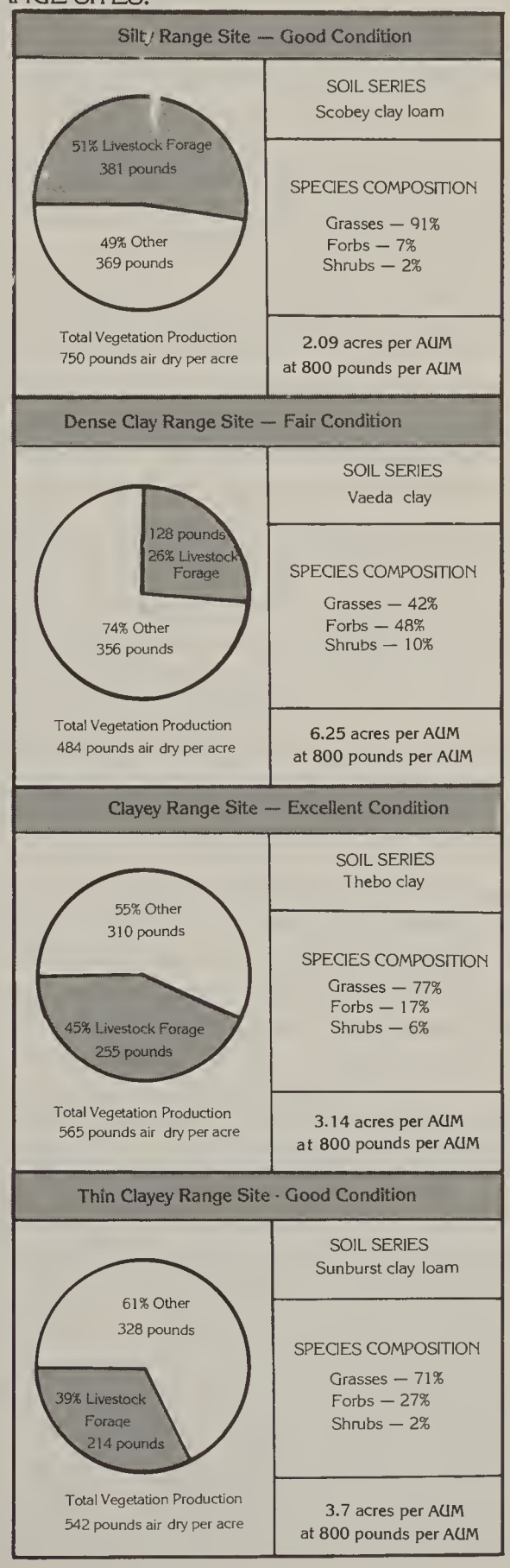
The highest sediment and water yields for subgroups 1, 2, 5 and 12 (Figure 3.4) were multiplied by the acreages of prairie dog towns to determine the initial sediment and water yields. To predict long term sediment and water yield changes due to prairie dog control, the mean of the lowest sediment and water yield values for these subgroups was multiplied by the acres receiving treatment.

Vegetation

Proper use stocking, allocating half the annual forage production to consumptive use by livestock and wildlife, helps ensure sustained yield and improvement of range vegetation. Proper use allows maintenance of plant food reserves, resists invasion of undesirable and unproductive plants and allows for the increase of desirable plants and groundwater supplies by improving ground cover and infiltration (Dyksterhuis, 1951). Proper use for the major forage plants is 50-55 percent (Lodge and Campbell, 1965) though some browse species can be used up to 60 percent (BLM Manual 4400). Heavier utilization (up to 80 percent) of crested wheatgrass is recommended on a periodic basis to maximize productivity (Lodge, Smoliak and Johnson, 1972). Light use (21-40 percent) is generally more conducive to improvement of range than moderate use (41-60 percent) (Smoliak and Johnson, 1979).

Range sites vary widely in the production of forage species due to differences in soil productivity and past management (Appendix 3.4). The proper use allocation of vegetation to non-consumptive uses (watershed protection, wildlife habitat and recreation) runs from about 50-75 percent of the annual total vegetation production. Range in poor and fair ecological range condition produces a greater proportion of non-forage species than range in good and excellent condition (BLM, SVIM, 1978-79). Figure 4.1 illustrates the varied percentages allocated to livestock forage and other uses on four range sites under proper use in Valley County.

FIGURE 4.1: VARIED PERCENT ALLOCATED TO LIVESTOCK FORAGE AND OTHER USES ON 4 RANGE SITES.



Source: BLM, 1980.

Heavy grazing stops root growth and since 30 percent of all root material must be replaced annually, this eventually reduces the root volume. Plant vigor diminishes with reduction in root volume and the plant cannot compete with undesirable plants that fill the open spaces left by dead roots and smaller plants. The end result is a deterioration in range condition (Dietz, 1975).

Hormay (1970) pointed out that it is unrealistic to assume that plants can be grazed at proper use levels through regulation of stocking because livestock graze selectively both by plant species and by areas. This results in overuse of preferred plants and accessible areas, especially floodplains and riparian zones. Selective grazing, constant stocking levels and the wide variability in annual production in the EIS area (see "Vegetation," Chapter 3) result in severe use of riparian zones and other areas near water in dry years. Thus proper use allocations must be combined with proper grazing management to ensure maintenance or improvement of vegetation over an entire allotment.

Cook (1966) found that grazing range plants during any part of the growth period reduces plant carbohydrate reserves which periodic deferment can restore. It has been long recognized that excessive early spring use is the most damaging. As much as 75 percent of plant's winter-stored carbohydrates are required to initiate the first 10 percent of growth (Hormay, 1970).

The deferment necessary to restore carbohydrate reserves can be provided by grazing systems that rotate use during the growth period, developing early spring pastures to defer the use of native range, proper use grazing and proper seasons of use. If the ecological range condition is unsatisfactory, improvement can also be made by a grazing system that provides for the physiological requirements of plants. This grazing system must periodically defer use until after flowering of key forage species (see Table 3.8).

The choice of a grazing system which incorporates grazing treatments designed to meet the objectives of a particular AMP depends on current resource conditions, responsiveness of the soils to management, water distribution, proposed land treatments, acreage, land ownership patterns and livestock management needs. Hormay (1970) stated that a single grazing system is not the best under all conditions. While some soils in the Prairie Potholes EIS area are very responsive to grazing management, others are very slow to respond. Where mechanical treatments are proposed, a grazing system which defers use for 1½-2 years following treatments would be necessary (Ryerson, 1980, Montana State University, Personal Communication).

Rest and deferment allow for the rapid recovery of most desirable forage plants on floodplains (subgroups 6 and 17) due to the productive nature of these soils. Responses of woody riparian vegetation, willows and cottonwood to grazing systems appears to be very slow. Various researchers (Winegar, 1977; Duff, 1977; Platts, 1978-79; Boldt, 1978; Behnke and Raleigh, 1978 and Ames, 1977) have shown that a complete rest treatment will bring about increases in woody riparian vegetation.

Rest and deferment treatments periodically exclude livestock from woody types (see Chapter 3) within pastures. The dominant woody species—buffaloberry, snowberry, rose, juniper, silver sagebrush and boxelder are increasers or are unaffected by grazing (Appendix 3.4). Because of this response to rest and deferment, no change or a slight decrease in production of these woody species would occur in the long term. Reduced rubbing damage by livestock to woody species and improved vigor and production of understory species would result.

In a study of various management systems on BLM allotments in the Missouri Breaks EIS area, Willard and Herman (1978) found that rest rotation was better than season long grazing but not as effective as winter grazing in improving water infiltration, allowing for better vigor of key species and for more litter (causing less cactus), and increasing the production of desirable grasses. No conclusions were made about the use of deferred rotation in this study because of the limited sample.

Winter grazing is the most favorable grazing treatment because all grazing takes place when plants are dormant. Plant carbohydrate reserves are least depleted during the dormant period. Vigorous plants and excellent litter cover result from winter grazing, conducive to high water infiltration. Infiltration rates are also improved because soil compaction caused by livestock occurs only during periodic thaws. Willard and Herman (1978) found that winter use improved vegetation more than any other grazing system.

There are many small allotments proposed for AMPs that have little topographic variety. Seasonal or season long use grazing might be the only option on these. Heady (1975) stated that a season long grazing period with proper use will maintain or slowly improve range condition, especially in short grass, annuals, sod grasses and grasslands with few species of extreme palatability.

Grazing seasons would be lengthened in the long term in some alternatives to use increased forage. This would cause more fall, winter and spring use to be authorized but would result in no net adverse affects under proper grazing management. Hormay (1970) reported that proper use grazing can occur at any time under rest rotation in a planned sequence of periodic use, deferment and rest.

Various mechanical treatments of clubmoss-blue grama ranges in Valley, Phillips, Hill, Liberty and Fergus Counties have been studied by the Montana State Experiment Station in Havre over the past 18 years (Ryerson, et al., 1970; Ryerson, Taylor and Houlton, 1974 and Ryerson, Houlton and Wambolt, 1980). Of

the mechanical treatments observed (pitting, chiseling and scalping), scalping has proven to be the most effective, especially when legumes and desirable forage grasses are interseeded. Vegetation response to deep contour furrowing is similar to scalping and is preferred on claypan soils where scalping machinery will not penetrate the dense claypan (BLM, "West Alkali" AMP, Phillips Resource Area, 1979).

An immediate response to the mechanical treatments above is an increase in forbs, especially fringed sagewort. The plant competes with seeded species for moisture and can affect the success of mechanical treatments during dry years. Fringed sagewort decreases to form a minor percentage of the plant composition within 4 years of the treatment, however.



Fringed Sagewort

Western and thickspike wheatgrass also increase rapidly following treatments as clubmoss-blue grama are reduced. Ecological range condition improves rapidly where desirable native species are present before treatments or if they are interseeded. Western wheatgrass (variety Rosana recommended), thickspike wheatgrass (variety Critana recommended) and green needlegrass have proven to be very successful in establishing when interseeded after scalping. Orenburg and Rambler alfalfa have also been very successful as interseeded species because of their deep root system that can use moisture beyond the reach of native grasses.

As a result of increases in desirable plants, range condition would improve to high, good or excellent in 5-10 years after mechanical treatments. Based on the available literature (Ryerson et al., 1970; Ryerson, Taylor, Houlton and Houlton, 1974; Houlton, 1975; Ryerson and Houlton, 1979 and Ryerson, Houlton and Wambolt, 1980), observations of treated areas and professional judgment, it is estimated that 75 percent of any mechanically treated acreage would reach excellent ecological range condition while the remainder would reach good condition.

Production increases of 150-500 percent have been observed on chiseling, pitting, scalping and contour furrowing mechanical treatments in the EIS area. The harshest treatments (scalping and furrowing) are the most productive and longest lasting. A site with scalping and interseeding treatments at the Havre Experiment Station still produces four times the vegetation of untreated plots after eighteen years. Average production increases are 200-250 percent. This increase is used in projecting the increase in forage production expressed in AUMs due to mechanical treatments (Appendices 2.2 and 2.3).

Treatments of crested wheatgrass combined with fencing into separate pastures are effective in changing the relative unpalatability of rank crested wheatgrass areas. Yields can be doubled by interseeding 1 pound of alfalfa per acre (Lodge, Smoliak and Johnson, 1972) and sustained (Dubbs, 1975 and Houlton, 1980, Northern Montana Agricultural Experiment Station, Personal Communication). Lodge, Smoliak and Johnson (1972) found that crested wheatgrass in combination with the native range yields far greater returns in forage production than native range alone. They found that the most effective grazing system was to graze crested wheatgrass May through mid-June with the native range and crested wheatgrass grazed "free choice" thereafter. The native range improved significantly after seven years with this system. Several present AMPs in the EIS area use this system.

Grazing systems based on the physiological requirements of the key plants would ensure maintenance or improvement of mechanically treated areas in the long term (Ryerson, 1970).

Range facilities contribute to improved condition and production of the rangelands by improving livestock distribution and allowing for rest and deferment of pastures or rest of riparian zones. Fences control livestock movement while water sources, shade, oilers and salt (when placed in the proper location) improve vegetation by distributing livestock better (Vallentine, 1971). Vegetation can be adversely affected where improperly located fences cause livestock concentrations, trailing and overuse (Vallentine, 1971).

Leafy spurge and other noxious weeds can outcompete desirable forage plants and reduce forage by 75 percent (*Leafy Spurge Symposium,* 1979). Control is very difficult but can be accomplished over several years (see Appendix 2.1). Proper applications of 2,4D and Tordon do not harm grass species which increase in response to weed control.

Prairie dogs, whose towns are usually associated with disturbed or overgrazed areas, destroy vegetation and contribute to deteriorated range condition and a loss in vegetation production. Grazing management influences the spread of prairie dogs. Craig Knowles (Montana Department of Fish, Wildlife and Parks, 1980) has demonstrated the influence of removing grazing on a

prairie dog town. Removal of livestock grazing on a friable clay upland site resulted in vegetation cover higher than prairie dogs would tolerate. Vegetation cover could be expected on soil subgroups 3, 4 and 10 (predominately friable clay soils). It is unlikely that livestock removal would produce such cover on the clubmoss-blue grama sites in fair range condition. Here vegetation is very slow to respond without grazing. Mechanical treatment on soil subgroups 1, 2, 9, 11 and 12 would produce similar tall vegetation that may also be intolerable to prairie dogs. While control of prairie dogs by grazing management alone is unlikely, chemical control would also be ineffective without improved grazing management.

Livestock

Studies have shown that per-acre livestock returns are higher under proper use grazing levels than under heavy use. Higher production per cow unit would offset the fewer cows being grazed under proper use (Houston and Woodward, 1966).

In some instances rotational grazing treatments would increase livestock stress and reduce productivity. Smoliak (1960) found that yearling gains were higher under continuous grazing than under deferred rotation in a southeastern Alberta study. The condition of vegetation and the level of livestock productivity at the time the grazing system is implemented bear on the relationship between rotation grazing and livestock productivity. Where the ecological range condition is poor or fair and the pasture overgrazed, livestock productivity would be low but would improve as forage condition improved (Smoliak, 1960 and Johnson and Smoliak, 1979). Where livestock productivity is high and forage conditions are generally good, rotational grazing would reduce gain per-animal although total production would be increased due to more livestock numbers (Smoliak, 1960).

The manner in which the livestock are handled and the time allowed for pasture moves are important in animal stress (Johnson and Smoliak, 1979). Where grazing systems have a minimum number of pastures to accomplish the desired improvement in vegetation and result in substantial increases in livestock AUMs, there would be no net negative impacts (Johnson and Smoliak, 1979).

Livestock would benefit from rest rotation systems, too, particularly in these systems where the rested pasture is used first the following spring. In the rested pasture the brood cows would be provided a reliable supply of nutritious forage at a critical time and the previous year's growth would provide shelter for young calves. This is attested to by personal observations of rest rotation grazing systems in the EIS area.

Grazing systems which require the fencing of large allotments into pastures would also improve calf crops by improving breeding success. The cows would be more concentrated and more available to the bulls (Johnson and Smoliak, 1979).

Where rest rotation systems were not applied, livestock production would be reduced for 1½-2 years on mechanically treated allotments. Scalping and furrowing treatments could cause animal losses (especially among sheep) if an animal should get on its back in a furrow and be unable to get up. The probability of this is low, as scalping and furrowing are not recommended on sheep allotments (Appendix 2.1).

Crested wheatgrass or Russian wildrye on early spring pasture would provide nutritious forage three weeks earlier than native range (Wilson, Thomas and Jacobson, 1971). The per-acre gains would be increased by about 50 percent where crested wheatgrass would be used as spring pasture (Johnson and Smoliak, 1979). A danger of bloat exists if alfalfa is interseeded with treatments but no loss with this practice has been reported to date (Ryerson, 1980, Montana State University, Personal Communication).

The forage increase from mechanical treatments with the higher protein content of forage would result in doubling or tripling the per-acre gains and maintenance of individual animal gains (Kartchner, 1981, Miles City Experiment Station, Personal Communication).

Riparian exclosure fences would increase livestock stress in some cases where livestock were excluded from sections of a creek bottom while other sections were available for use in the same pasture, causing longer trailing to water, shade and rubbing sources. Well-placed water facilities, oilers, insecticide devices and shade sources would reduce the need to trail long distances between water, shade and rubbing sources and feeding areas and would improve livestock distribution. Vallentine (1971) recommended that water supplies be placed so cattle would not have to trail more than 1 mile to water and Mackie (1970) reported almost no livestock use of water at distances greater than 1 mile. Urick (Urick, 1981, Miles City Experiment Station, Personal Communication) noted that, while virtually no local studies on the effects of water quality and availability and the presence of artificial shade or insecticide devices on animal gains had been completed, all are important factors. These effects on animal gains would vary depending on the current situation in an individual allotment. Urick also pointed out that artificial shade and insecticide devices must be located where they will be used (i.e. near water) if they are to be effective.

Wildlife

Important wildlife habitat for the species listed in Chapter 3 is located throughout the EIS area. Since specific wildlife objectives govern the proposals of an alternative, it is important to know where important wildlife habitat exists in an allotment. This is shown in Appendix 4.1.

BIG GAME (DEER, ANTELOPE, ELK)

Grazing treatments which provide spring rest or deferment improve the quality and quantity of big game forage (Mackie, 1970; Knowles, 1975 and Komberec, 1976). Vegetation production above the current forage allocation to big game would help satisfy expanding big game populations, recognizing that severe winter weather and harvest quotas set by the Montana Department of Fish, Wildlife and Parks cause populations to fluctuate.

Rest or deferment grazing treatments would make forage (especially forbs) more available to big game species in the spring. When livestock move into the pasture after the deferment (late spring—early summer), grasses would be used most heavily. This provides for more even use of vegetation by big game and livestock while improving the availability of big game spring and summer forage (Mackie, 1970; Knowles, 1975 and Komberec, 1976).

In the long term periodic spring deferment would make succulent green forbs and grasses available to deer, antelope and elk, improving the physical condition of the females during gestation and lactation (Verme, 1969). Rest or deferment should help provide sufficient winter forage to carry the projected increases in deer and antelope populations through the winter.

Interseeding and the secondary succession of forbs and grasses in mechanically treated areas would provide additional spring and summer forage used by deer and antelope (Tables 3.16 and 3.18). Native forbs from the secondary succession would be dominant in the short term while introduced forbs (alfalfa) from the interseedings would be more prevalent in the long term.

Shrubs found in mechanically treated clubmoss-blue grama ranges might be reduced in density but the remaining shrubs would improve in vigor, providing winter habitat for deer and antelope. Shrub density would depend upon the mechanical treatment, chiseling being the least severe while contour furrowing and scalping are the most severe. Surface disturbances from mechanical treatments could slightly impede the movement of deer and antelope. All land treatments would follow the *Memorandum of Understanding* and supplements between BLM and the Montana Department of Fish, Wildlife and Parks.

Livestock use of crested wheatgrass pastures in lieu of native range during the spring would make additional grasses and forbs available for big game (Mackie, 1970; Knowles, 1975 and Komberec, 1976).

Locating shade, insecticide devices/oilers, salt and water sources on the uplands currently receiving light use (Mattise, 1978) would draw livestock away from riparian drainage bottoms and woodlands (Behnke and Raliegh, 1978), improving the quality of riparian vegetation cover while slightly reducing the forage on the uplands.

Resting riparian vegetation 4-10 years would allow the vegetation to regain vigor and provide more habitat for big game and most other wildlife found in the EIS area. After initial rest the area would be grazed in the late fall-winter; otherwise, the vegetation would again lose its value as wildlife habitat (Duff, 1977 and Platts, 1978). Grazing treatments with rest or deferment, range facilities and land treatments which draw livestock away from riparian zones would cause only a very slow vegetation response. All riparian vegetation exposed to season long grazing would either remain in its present condition or continue to deteriorate.

Movement of deer and antelope would not be hampered by the use of standard antelope type pasture fences which would be necessary to implement grazing systems.

Elk in the Sweet Grass Hills would not be allowed to increase to more than the present 150 head because of the damage they cause to private landowners. The quality of elk habitat would improve, however, from grazing treatments applied in some alternatives.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE AND RING-NECKED PHEASANT)

Upland game birds require residual vegetation cover for nesting and winter survival. This cover must come from the "carry-over" vegetation left from the previous grazing season because nesting takes place before there is sufficient new vegetation for cover. Mattise (1978) reported that seasonal grazing provides the required habitat in areas of light or no grazing. In the long term residual cover in the current light use areas would be reduced through proper distribution. Additional residual vegetation from greater vegetation production, however, would help provide cover and food for the current numbers of upland game birds and any additional population. Land treatments and periodic spring deferment of carry-over residual cover would provide sufficient forage for nesting and also for brood rearing and winter survival.

Four-pasture deferred or rest rotation grazing treatments would provide sufficient residual cover for nesting in the rest and/or deferred pastures. Nielsen (1978) reported that sharp-tailed grouse do not move to areas of high residual cover (rest pasture) for nesting but rely on what is available within 1 mile of their mating ground. He also stated that the rest rotation treatment in his study did not benefit sharp-tails because the vegetation response was static. With proper stocking rates, this response should increase, providing better quality

cover and more potential for larger upland game bird populations. Seasonal and less-than-four pasture deferred or rest rotation grazing treatments, even with proper distribution of livestock, would not supply the additional residual cover for more upland game birds.

Mechanical treatments would slightly decrease upland game bird habitat in the short term. In the long term, however, mechanical treatments would provide the potential for larger sage and sharp-tailed grouse populations because of the additional topographic and vegetation cover and forage created.

Although sharp-tails nest in crested wheatgrass (Mattise, 1978), it is in response to poor quality native habitat (Robert Eng, 1979, Montana State University, Personal Communication). The use of crested wheatgrass with grazing treatments would confine livestock to the area in the spring and improve the quality of the cover on nearby native range for nesting and winter survival.

Resting riparian vegetation would provide additional food and cover for upland game birds. These areas are especially important as they provide cover and forage during the winter months. The control of noxious weeds and prairie dogs would not significantly affect upland game birds because of the small acreages affected and the methods of application.

WATERFOWL

In the long term additional residual vegetation from more vegetation production because of grazing and land treatments would help satisfy the needs of waterfowl that nest in the uplands when cover is unavailable near water. There would be no additional residual cover for shore nesting waterfowl along shorelines of grazed potholes and reservoirs. Adequate residual vegetation for nesting and brood rearing would be available only where there is dense cover, i.e. near reservoirs in or adjacent to rested and deferred pastures (Berg, 1956; Lokemoen, 1973 and Johnson, et al., 1978). Waterfowl have an advantage over upland game birds in that they will seek out residual cover in these types of pastures (Gjersing, 1973).

Mechanical treatments within 5 miles of potholes and reservoirs would provide additional nesting cover for waterfowl, especially for puddle ducks. The more severe the mechanical treatment, the more positive the vegetative response (Ryerson, et al., 1980). More vegetation would provide more cover for nesting in the furrows and spaces between the furrows. Deep furrows could collect water, however, that would destroy some duck nests but mechanical treatments would provide better cover for nesting waterfowl overall in the long term.

While waterfowl occasionally nest in crested wheatgrass (Gjersing, 1971), they would benefit more from the additional residual cover left on the native range (Gjersing, 1971 and Mundinger, 1975) when livestock are confined to the crested wheatgrass pastures. Rest in saline seeps and riparian zones would also provide more cover and forage for nesting waterfowl. Vegetation would increase in vigor and the additional cover would provide nesting and brooding areas for greater waterfowl populations.

The control of noxious weeds or prairie dogs would not significantly affect waterfowl because of the small acreages affected and the methods of control.

NONGAME

The quality and quantity of nongame forage and cover would increase as a result of grazing treatments, land treatments and the proper location of range facilities. Gjersing (1971) and Mundinger (1975) indicated that grazing treatments with rest provide residual vegetation for waterfowl which would also be used by nongame wildlife. More vegetation would provide additional cover and forage to improve the abundance and diversity of nongame species.

Mechanical treatments would improve the current habitat and provide new habitat for many nongame species. Rabbits, small rodents and ground-nesting birds would use the topographic and vegetation cover and food provided by mechanical treatments. Some nongame birds, such as the horned lark and chestnut-collared longspur, prefer the open grasslands without much cover. There would be a decrease in suitable habitat for such species in the mechanically treated areas.

Small animals would be destroyed during mechanical treatments but the losses would probably be insignificant over the long term. The furrows left by scalping and contour furrowing concentrate water and would destroy the nests of some ground nesting species.

Use of crested wheatgrass in early use pastures would increase residual cover on native range which would be used by many nongame animals as cover.

Rested pastures in deferred or rest grazing systems would provide more cover and forage for more than 100 nongame species which use this vegetation (BLM, 1980, 6602 File). Rest would allow plants to regain their vigor and increase production.

Range management and livestock exclosure fences would provide more perching sites for many nongame birds such as hawks, eagles, horned larks, lark buntings and western meadowlarks.

Grazing treatments with rested or deferred pastures would improve nongame habitat along the shoreline of present and future water sources. Livestock concentrate in these areas, removing the vegetation cover around the water. Rest or deferment allows the vegetation to regain vigor and provides cover in the rested or deferred pastures.

The control of noxious weeds would not significantly affect nongame wildlife because of the small acreage affected and the methods of application. Prairie dog

control would be done with zinc phosphide. The poison breaks down rapidly in the dead prairie dogs and would not have secondary effects on scavengers.

Prairie Dog



FISHERIES

Shorelines bare of vegetation are prone to accelerated erosion and allow more sediment to be deposited in reservoirs. Grazing treatments by themselves would not provide the necessary shoreline vegetation around unfenced water sources (BLM, 1975; Duff, 1977 and Platts, 1978). Grazing treatments with spring grazing of crested wheatgrass, mechanical treatments, fencing of reservoirs and construction of new reservoirs would increase shoreline vegetation.

Spring grazing of crested wheatgrass by livestock would defer or reduce livestock concentrations around fishing reservoirs, slightly extending the life of the fisheries.

Mechanical treatments are designed to hold precipitation and increase infiltration (Ryerson, et al., 1980). The effect of holding water in place would decrease runoff and would prevent reservoirs from filling with sediment as rapidly as they would otherwise. Reservoirs with low water levels are much more prone to summer kills and winter kills of fish, however, so snow harvesting would have to be used in areas where runoff is reduced by mechanical treatments. Mechanical treatments also provide additional vegetation that would improve livestock distribution and could possibly relieve some of the grazing pressure around fishing reservoirs. This would slightly improve the quality of the fisheries.

Fishing reservoirs rested by fencing to exclude livestock would have higher quality water and a longer lifespan as a fisheries than those left unfenced. New reservoirs that develop into fisheries would not be fenced so livestock concentrations around them would reduce their useful life in the long term through sedimentation. About 2 percent of the new water sources should be suitable for fisheries if the reservoir has adequate total depth and average depth to sustain fish, physical and legal access and is close to a population center.

Additional water sources in pastures with fisheries would more evenly distribute livestock, slightly reducing livestock concentrations around shorelines of the fisheries reservoirs.

Numerous studies have documented the effects of grazing on the aquatic ecosystem (Duff, 1977; Marcuson, 1977; Behnke and Zarn, 1976; Platts, 1978 and Behnke and Raliegh, 1978). Impacts such as sedimentation, changes in channel morphology, nutrient loading and increased water temperature are some of the factors that deteriorate due to livestock grazing on streambanks.

Recreation, Wilderness and Visual Resources

RECREATION

The "General Impacts" of the "Wildlife" section discusses how vegetation allocation, grazing and mechanical treatments, range facilities and chemical treatments affect wildlife and fish populations. The potential for increasing or decreasing wildlife and fish populations would most affect hunting and fishing, the two major recreational activities in the EIS area.

It is assumed that an increase in game populations would create a similar increase in hunting opportunities. Changes in big game and waterfowl populations have been quantified by alternative to measure the potential effect on hunting. Impacts to fishing are measured by changes in the numbers of fisheries rather than changes in fish populations which are unavailable.



Factors affecting hunting and fishing quality, such as access, ease of movement and water quality would also be affected by vegetation allocations and other proposals in the alternatives. BLM's Recreation Information System (see the Glossary) defines hunting quality in terms of game populations, access and ease of movement and shooting opportunities. Fishing quality is based on fish populations, water levels and quality and the potential for propogation. All of the factors which affect hunting and fishing quality are discussed by alternative as they would apply.

Free access is important in evaluating the quality of the recreational experience for activities such as hunting, fishing, ORV use and snowmobiling. Whenever additional fencing is proposed, it has the potential of decreasing cross country access, creating a negative impact to recreation.

Recreational use on the Upper Missouri Wild and Scenic River should not be significantly affected by any of the alternatives. No AMPs are proposed in the river corridor. Annual recreation use would depend more on weather, water levels and the costs of gasoline and supplies than on how shoreline vegetation is allocated among resources.

WILDERNESS

The Interim Management Policy and Guidelines for Lands Under Wilderness Review (IMP) defines those activities that are allowed in the Bittercreek Wilderness Study Area (WSA) until a final decision is made by Congress on the wilderness designation.

Grazing use at proper stocking levels has been determined to be compatible with wilderness suitability. "Grandfathered" grazing use (see the "Glossary"), that use authorized in Bittercreek during the 1976 grazing fee year, would be permitted as long as any changes (i.e. in numbers and kinds of livestock or seasons of use) would not cause a declining condition or trend of vegetation or soil. Grazing systems may be established as long as new improvements needed to implement the system were non-impairing to wilderness as defined in the IMP.

To meet the range resource objectives (Appendix 1.2), a substantial part of the Bittercreek Unit would require mechanical treatments and/or inclusion in grazing systems. Appendix 2.4 describes areas suitable for mechanical treatment by allotment. Mechanical treatments, including scalping and contour furrowing, would only be allowed if the project met the non-impairment criteria of the IMP. New grazing systems would be proposed in allotments 4054, 4055 and 4056. Currently, rest rotation systems are in place in allotments 4041, 4053, 4718 and 4726. Those range developments existing prior to passage of FLPMA (October 21, 1976), are grandfathered and their use and maintenance may continue as part of a current or new grazing system. New permanent range projects, however, would be allowed only if their construction would not impair wilderness suitability. As the allotment and the Bittercreek WSA boundaries do not coincide (see the *Allotment Overlay*), only 59,112 acres of a total of 105,000 in the 7 affected allotments lie within the WSA boundary. While it is likely that some of the acreage recommended for mechanical treatments or range developments would be outside the WSA, this analysis assumes the "worst-case" situation that all projects would fall inside the WSA. A final decision on whether mechanical treatments or range projects would be allowed must be determined through environmental assessments on a case-by-case basis.

As discussed in the "Wildlife" and "Watershed" sections of this EIS, rest rotation or other grazing systems calling for deferred grazing or late turn-out would improve grass production, wildlife habitat and watershed which could, in turn, improve the aesthetics of the Bittercreek WSA. Proper placement of salt, shade, insecticide devices/oilers and new water sources which help reduce trailing and associated erosion would also benefit the wilderness resource.

VISUAL RESOURCES

The extent of surface disturbances in the short term would be the major factor affecting visual resources among alternatives in this EIS. Long term impacts would depend on the capacity of the landscape to recover from these disturbances. Grazing systems and specific projects designed to increase vegetation and stabilize soils would improve scenic quality and are discussed by alternative.

Table 4.2 shows the average unmitigated impact of land treatments or range developments for each of the four Visual Resource Management Class (VRM) landscapes in the EIS area. Appendix 2.1 describes the methods used to develop this table.

Each visual class requires that projects meet certain criteria to satisfy VRM objectives. For Class I areas, only natural ecological changes are allowed. The "Wild" segment of the Upper Missouri Wild and Scenic River has the only Class I designation in the EIS area. In the short term all range or watershed improvement projects located in a Class I area would have a high negative impact. Since no AMP allotments are located in Class I areas, no impacts would be anticipated.

Twelve percent of the EIS area is rated as Class II, containing primarily excellent Class A scenery. These have similar values to Class I areas. There is some chance that range developments would be proposed in Class II areas. Table 4.2 shows the average unmitigated impacts that could be caused by the various projects as Class II landscapes in the EIS area are primarily located in highly eroded drainages and the small isolated mountain ranges. These areas are not suitable for mechanical treatments. No associated surface disturbance would occur.

Class III and IV areas make up the bulk of the EIS area. Most range improvement projects would be proposed in these areas. Table 4.2 shows the average impact of various projects that might occur in these management classes. Most impacts are rated low because projects could be accomplished within the guidelines for these classes.

Long term irreversible or irretrievable commitments to visual classes could only occur if management should ignore visual class considerations in the development of the projects.

Table 4.2: RELATIVE LEVEL OF IMPACT TO VISUAL CLASS BY PROJECT

Projects	Major Contrasting Elements	Feature Type	Class I	Class II	Class III	Class IV
Wells-Springs-Tanks	Color Form	Structure	H	H	L	L
Pipeline (buried)	Line	Vegetation Landform	M	M	L	L
Reservoirs-Water Catchment	Form Line	Landform Structure	H	H	M	L
Shade Sources (structure)	Form	Structure	H	H	M	L
Oilers-salt	Form	Structure	H	L	L	L
Fences-Cattleguards	Line	Structure	H	M	L	L
Vegetative Manipulations	Line Color Texture	Vegetative	H	H	L	L
Mowing	Line Texture	Vegetative	M	L	L	L
Burning	Line Color Texture	Vegetative	H	H	L	L
Spraying	Line Color Texture	Vegetative	H	H	L	L
Fence Line Contrasts	Line Color	Vegetative	H	M	L	L
Roads-Trails	Line	Landform	H	H	M	L

*All impacts are negative and measured at the time of the project

Source: 8400 Manual — Recreation Specialist - EIS Team

H—High M—Medium L—Low

Cultural Resources

Cultural evidence is meaningful largely in relation to the degree that the site from which it comes has remained undisturbed. An artifact or feature might be important but the association or context in which it was found might be much more significant. When these sites are disturbed, the opportunity for serious analysis by the archeologist or the historian is lost.

As noted in Chapter 3, the available sampling inventory data on about 7 percent of the EIS area indicates a density of about .01 sites per acre or one site per 100 acres. The land treatment figures given in each alternative assume that the land had not been previously turned.

Each of the six alternatives call for different levels of these land or grazing treatments: forage allocations, grazing treatments, mechanical treatments, water developments, chemical treatments and range facilities. Because the most significant effects occur when the integrity of the site is altered by ground disturbances, mechanical treatments and water developments would cause impacts to a quantifiable number of cultural sites.

Forage allocations, grazing treatments, chemical treatments and range facilities each improve ground cover but do not cause significant surface disturbance, so they should actually improve preservation of cultural resources by improving the conditions which maintain the integrity of a site.

The maximum number of sites which could be affected is 9,240 in Alternative C. This figure and the others for the remaining alternatives are only predictions based on sampling inventories in the region.

Because a *Programmatic Memorandum of Agreement* (PMOA) is in effect between BLM and the Advisory Council on Historic Preservation (see Appendix 4.2), specific procedures would be followed to identify actual effects on range projects and to avoid or to mitigate those impacts.

The nature of range developments, including mechanical treatments and water developments, would allow most inventoried cultural sites to be avoided. BLM estimates that 90 percent of all sites would therefore not be affected. About 80 percent of the remaining sites belong to common site types, such as tipi rings and lithic scatters. Some of these sites do not contain sufficient information to constitute a significant impact.

All of the more scarce sites and some of the common sites would require excavation, building removal, fencing or some other measure to mitigate the effects on them. The costs of these measures would range from approximately $2,000 per site to as much as $100,000 for a large and complex buried archeological site. Sites requiring extensive study would probably cause a project to cost too much in relation to the benefits it might bring. In effect, the impacts would be eliminated by effectively eliminating the project. Perhaps 95 percent of these sites would not have mitigation costs above $10,000 per site, however.

Social and Economic Impacts

The "Ranch Related Economic Impacts" and the "Social Impacts" sections in this EIS always refer to the entire EIS area with 558 affected ranches while the "Recreation/Wildlife Related Economic Impacts" and "Regional Economic Impacts" sections refer to the intensive study area with 462 affected ranches.

RANCH RELATED ECONOMIC IMPACTS

This section analyzes the direct effects of increases and decreases in grazing on ranch income, permit values and ranch employment in the EIS area. The economic impact on ranch income caused by changes in grazing for the 12 representative ranch types (see "Ranch Related Economics," Chapter 3) was determined through a linear programming model (Appendix 3.13). All income information is calculated from these average budgets. Although the term "representative ranch" is used, the region has no real representative ranch. Each operation is unique. The impact on individual ranch incomes varies by the dependency on BLM grazing, the amount of the change in BLM grazing, the size of the operation, the way the operator would adjust the ranch operation to changes in grazing and the amount of cash crops raised. Changes in income are calculated on the assumption that ranch operators would adjust herd sizes in response to changes in AUMs but some operators might prefer to extend their grazing season to use additional AUMs. Some might also elect to feed cattle in response to decreases. In these cases herd size would not change. All changes in net ranch income are compared to the current total of $8,576,322 for the 558 operations under study.

The impact on ranch income is measured only by the change in the number of BLM AUMs. Economic benefits can also be produced by such qualitative changes as improved range condition and water distribution (Kothmann, 1970). Benefits can include heavier calves, increased calf crops and possibly even reduced death losses. It is entirely possible that a ranch operator, even though he reduces the size of his herd, may end up selling more pounds of beef in the fall because of these economic factors.

Grazing systems would increase the cost to ranch operations in such areas as increased fence maintenance, increased efforts in monitoring forage conditions and more movement of livestock. These costs are included in the ranch budget models (Appendix 3.13).

The calulation of ranch employment changes are also explained in Appendix 3.13. These changes are based on the assumption that the number of equivalent to full time employees would vary directly according the herd size changes, a not entirely valid assumption because larger operations might turn to increasing mechanization. Also a small change in herd size might not result in a proportional change in the number of employees. All changes in ranch employment are compared to the present total of 175 employees for the 558 ranches under study.

Adjustments in BLM grazing would effect the total value of BLM grazing permits. The market value of the BLM permit is presently estimated to be $100 per AUM (Chapter 3, "Ranch Related Economics") and a change would cause a loss/gain in the capital position (wealth) of affected ranches. This change would be realized as cash only if the rach or a portion of the ranch is sold, transferred or used as collateral for a loan. All changes in permit value are compared to the current total of $31,258,000 for the 558 ranches under study.

RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

Recreation/wildlife related impacts are estimated by increases in expenditures (sales) for deer, antelope and waterfowl hunting in the intensive study area (Hill, Blaine, Phillips and Valley Counties). Direct and indirect increases in earnings and employment are calculated from these expenditures (Appendix 3.14). Short term increases would not usually occur because the biological response to improved habitat would not be immediate. Deer hunting would generate the largest part of

the increase for all alternatives. Changes in expenditures for each alternative are compared to the present total for deer, antelope and waterfowl hunting of $135,000.

Changes in expenditures because of changes in fishing, upland game bird and prairie dog hunting opportunities and wildlife observation are unquantified because of the lack of information.

SOCIAL IMPACTS

None of the alternatives would change the general attitudes or values presently held by the residents of the Prairie Potholes EIS area but they would affect attitudes toward and expectations of BLM and the Federal government in general. Two aspects of these alternatives would cause major reactions in the residents of the area: 1) changes in the amount of forage available for livestock grazing and 2) changes in the level of government control. The majority of the residents regard livestock grazing as the best use of public lands (Chapter 3, "Social Impacts"). They feel that multiple use land management is already being practiced and wildlife is currently being provided for at an acceptable level. In addition, they perceive the increasing involvement of the Federal government in their lives as a major threat; thus any change in the status quo might be viewed with alarm.

Changes in BLM grazing would have an effect on ranch income and permit values which in turn would have an effect on the social well-being of families who depend on these ranches. Any increases in ranch income would raise the standard of living. The social well-being of small livestock operators with small cash crops has the greatest potential for being affected since these people are currently earning a minimum income and any change would have an effect on their standard of living. Income reductions could force families to seek off-ranch employment, if they are not already employed off the ranch. This could drastically affect lifestyles. Operators who have never had to work for anyone would lose some of their independence. Basic family relationships would be disrupted with members of the family working off the ranch. Operators and families that are forced to sell would have to change their way of life entirely; for those that do not have the training and skills to enter into the job market, the impact would be devastating.

REGIONAL ECONOMIC IMPACTS

Direct and indirect changes in intensive study area output, earnings and employment are based on estimated changes in livestock sales, range development construction, recreation expenditures and government employment (Appendix 3.16). Increases in Federal government employment (predominately resource and operations personnel) would be needed to develop and implement AMPs, administer range development contracts and provide maintenance to range developments. Typically, fewer Federal employees would be needed in the long term than the short term because not as many operations personnel would be required to monitor construction contracts in the long term. In addition, fewer construction jobs are generated in the long term for maintenance of range developments than in the short term for construction of these projects. Changes in earnings and employment are compared to the total present intensive study area figures of $200,013,000 and 19,520, respectively.

Grazing adjustments would result in changes in numbers of livestock and therefore changes in the local property tax base (Chapter 3, "Regional Economic Conditions"). Changes in these taxes are compared to the total present intensive study area figure of $553,000 that is paid by the 462 operations under study.

ALTERNATIVE A

This alternative would result in the following short and long term vegetation allocations:

	Short Term AUMs	Long Term AUMs
Livestock	319,065	379,721
Wildlife	20,538	25,734
Non-consumptive	339,603	423,455
Totals	679,206	846,910

Ninety-three current AMPs (covering 558,986 acres) would be revised and new AMPs would be developed for 419 allotments (1,062,754 acres). No AMPs would be applied on 392 allotments (121,253 acres). The proposed vegetation allocations, supported by the grazing and mechanical treatments, including range developments, would provide a balance between consumptive use by wildlife and livestock and non-consumptive uses such as watershed, scenic quality and recreation.

Fencing 28 miles of high quality streamside riparian zones in the EIS area would provide continuous rest for 4-10 years on 15 percent (679 acres) of the total of those zones.

After vegetation in the fenced area has improved to 90 percent of optimum streambank cover, rotational or rest treatments would be applied. The remaining 158 miles (3,830 acres) of high quality streamside riparian zones would be considered for rest or deferred grazing treatments.

Riparian vegetation on 575 seeps, averaging 1 acre in size, and around 11 fishing reservoirs (70 acres) would also be rested continuously for 4-10 years. Rotational or rest grazing treatments would be applied following the initial rest.

Grazing would be periodically deferred until peak flowering time for key plant species on 138 allotments (335,048 acres) slated for proposed AMPs and on 20

allotments (156,195 acres) that now have AMPs that are in predominately (at least 50 percent) fair or poor ecological range condition. The remaining 281 allotments (727,706 acres) proposed for AMP development and 73 allotments (402,791 acres) with current AMPs would all be considered for rest, deferment or rotational grazing treatments to attain good or excellent condition on 80 percent of their range.

Mechanical treatments might be done on any of 509 allotments with proposed or current AMPs but would primarily involve 449 allotments (1,333,714 acres). Mechanical treatment would be done on a total of 281,000 acres of primarily clubmoss-blue grama sites that fall within soil subgroups 1, 2 and 5.

About 650 miles of pasture and allotment boundary fences would be needed to support the grazing treatments. An additional 163 miles of fences would be needed to exclude livestock from riparian zones. About 1,000 water sources would also be developed and 50 cattle guards set in place. An undetermined number of shade sources for livestock and insecticide devices would also be built.

Chemical treatment of 2,200 acres of noxious weeds and 1,100 acres of prairie dog towns would occur. The total cost of range improvements for this alternative would be $14,356,300.

The environmental consequences to specific resources of this alternative are as follows.

Watershed

Development of new and revised AMPs would improve watershed condition by rest and deferment grazing treatments, establishing proper-use stocking rates and improving distribution of livestock. Grazing treatments and livestock management proposed in this alternative would result in a decrease in sediment yield from 3,429 acre-feet/year inititally to 1,567 acre-feet/year in the long term (Table 4.3). Sediment yield reductions would be greatest on soil subgroups 3, 4, 10 and 11. Water yield would likewise decrease in the long term from 139,788 acre-feet/year to 78,262 acre-feet/year in the short term. Soil subgroups 3, 4, 6, 10, 11 and 18 would show the greatest decrease in water yield.

Excluding livestock from riparian vegetation along streams, around fishing reservoirs and saline seeps would result in a long term decrease in sediment yield from 4.1 acre-feet/year to .21 acre-feet/year. Water yield would decrease from 160 acre-feet/year to 49.7 acre-feet/year. Sediment and water yield reductions would be greatest on soil subgroups 6 and 17. Water quality and stream channel stability would improve in the long term with reduced levels of suspended sediment in runoff water. Suspended sediment concentration, nutrient levels and fecal bacteria concentrations would be significantly reduced in the fenced reservoirs also.

Mechanical treatments of soil subgroups 1, 2, 5, 8, 9, 10, 11 and 18 and the subsequent increases in vegetation production would reduce sediment yield from 862 acre-feet/year initially to near zero in tne long term. Water yield would also decrease from 33,997 acre-feet/year initially to near zero in the long term. Water quality would be significantly improved by reducing runoff from treated clubmoss-blue grama soils currently causing offsite erosion. Reduced suspended sediment and fecal bacteria in runoff water would improve water quality. Channel stability would be increased with reduced amounts of sediment loading of drainageways.

Range facilities would result in lowered sediment yield from 0.5 acre-feet/year initially to 0.45 acre-feet/year in the long term. Water yield would increase from 17.9 acre-feet/year to 17.91 acre-feet/year in the long term. This runoff and sediment yield would reduce surface water quality slightly.

Consumptive water use by livestock would increase from the initial quantity of 3,523 acre-feet/year to 4,392 acre-feet/year based on increases in livestock AUMs (Table 2.1 and Appendix 4.3).

Chemical treatments to control noxious weeds would reduce the initial offsite sediment yield from 6.8 acre-feet/year to 1.5 acre-feet/year in the long term. Water yield would be reduced from 266.2 acre-feet/year initially to 82.5 acre-feet/year in the long term.

Control of prairie dogs and the rehabilitation of townsites would reduce sediment yield from the initial rate of 3.4 acre-feet/year to 0.8 acre-feet/year in the long term. Water yield would decrease from 133 acre-feet/year to 41 acre-feet/year in the long term. Water quality would improve as sediment yield dropped from the reestablishment of vegetation cover on prairie dog towns.

CONCLUSIONS

This alternative would result in moderately significant decreases in sediment and water yields (Table 4.3). On 1,621,741 acres, sediment yields would be reduced from 4,678 acre-feet/year initially to 1,941 acre-feet/year, a significant decrease of 949 acre-feet/year. Water yield also would be reduced significantly from 189,032 acre-feet/year initially to 93,123 acre-feet/year.

Water quality would improve significantly in the long term by reductions in suspended sediment, nutrient and fecal bacteria concentrations contained in runoff water. The long term consumptive use of water by livestock, 4,392 acre-feet/year, would be insignificant compared to the 17,000 acre-feet contained in stockwater reservoirs.

There would be no irretrievable or irreversible loss to soil and water resources in this alternative.

Increasing the vegetation allocation to nonconsumptive users from the equivalent of 339,603 AUMs to the equivalent of 423,455 AUMs would provide additional residual vegetation and litter cover necessary for watershed protection as increased cover and litter promotes water infiltration and reduces runoff and erosion (see "Vegetation", Chapter 3).

TABLE 4.3: SUMMARY OF WATERSHED IMPACTS BY TREATMENTS AND FACILITIES

ALTERNATIVE A

Element	Sediment Yield (ac-ft/yr) Initial	Sediment Yield (ac-ft/yr) Long Term	Water Yield (ac-ft/yr) Initial	Water Yield (ac-ft/yr) Long Term	Water Quality	Consumptive Water Use by Livestock (ac-ft/yr) Initial	Consumptive Water Use by Livestock (ac-ft/yr) Long Term
Grazing Treatments	3,429.0	1,567.00	139,788.1	78,262	+		
Exclosures	4.1	.21	160.2	49.7	+		
Mechanical Land Treatments on 281,000 acres	862.3	0	33,997.0	0	+		
Range Facilities	0.5	.45	17.9	17.91	+		
Water Developments	I	I	I	I	0		
Chemical Treatments							
—Noxious Weeds	6.8	1.5	266.2	82.5	+		
—Prairie Dogs	3.4	.8	133.1	41.3	+		
Non-Treatment	372.1	371	14,699.7	14,670	0		
Totals for Existing and Proposed AMPs	4,678.2	1,941	189,031.8	93,123	+	3,523	4,392

I - Insignificant
- - Not applicable in this Alternative
Source: BLM, 1980

+1 - Increase Water Quality
0 - No change in Water Quality
-1 - Decrease Water Quality

Vegetation

Current proper use vegetation allocations would either continue or be adjusted to reach proper use in the short term. Plant vigor, production and range condition would be maintained in the short term, based on trend studies of the 93 present AMPs and range conditions by AMP status (Tables 3.9 and 3.13). Proper use allocations and improved grazing management in the long term would ensure maintenance or improvement of plants.

Exclosure of high value riparian zones for 4-10 years followed by rotational grazing treatments of rest or deferment (Appendix 2.1) would improve riparian vegetation to 90 percent of optimum (Appendix 3.9) in the long term to meet the resource objectives of this alternative (Appendix 1.2). Periodic rest and/or deferment on the remaining high value riparian zones and the proper location of range facilities would reduce rubbing damage and overuse of these areas by livestock. This would improve vigor, production and composition of desirable grass species but willows and cottonwood would not increase significantly.

Exclosing 645 acres of reservoirs and saline seeps by fences would increase the production of shoreline and seep vegetation, especially deep-rooted species such as willow, cottonwood and salt-tolerant introduced plants such as tall wheatgrass. Grazing treatments of periodic rest and deferment (after 4-10 years) would maintain the vigor of these plants. Vigorous plants would use the extra moisture in seep exclosures, limiting the spread of saline seeps. This would prevent the loss of desirable plants that are not salt-tolerant.

Shoreline and saline seep vegetation surrounding about 2,287 unfenced reservoirs and pits would improve slightly due to rest and deferment treatments and the construction of more water sources. This would result in lighter use for shorter periods in livestock concentration areas.

Rest and deferment treatments would continue on present AMP allotments and are proposed for 275 allotments (totaling 796,188 acres). These treatments would periodically exclude livestock use from woody types within pastures. Reduced rubbing damage to woody species by livestock and improved vigor and production of understory species would result.

The periodic deferment of grazing until flowering dates of key species in allotments with more than 50 percent fair and poor ecological range condition would allow carbohydrate reserves of plants to be restored and would contribute to the improved vigor and production of forage plants also.

Rest and deferment grazing treatments, applied as necessary to accomplish management objectives on all AMP allotments, would improve vegetation on most soils. The long term impact would be most significant in soil subgroups 3, 4, 6, 8, 10, 15, 16, 17 and 19. In these subgroups ecological range condition would improve to good or excellent and production would increase accordingly. Approximately 146,396 acres of subgroups 3, 6, 7, 16 and 17 would improve from good

to excellent ecological range condition, 138,828 acres of subgroups 3, 4, 6, 8, 10, 15, 16, 17 and 19 would improve from fair to good and 6,694 acres would improve from poor to fair ecological range condition. Although range condition would not improve significantly on other subgroups, plant vigor, litter and water infiltration would increase. Vegetation production, in terms of livestock forage, would increase by 17,500 AUMs as a result of improved range condition on soils responsive to grazing treatments. (Increases in ecological condition and forage production brought about by grazing systems following prairie dog and noxious weed control are included in the totals above.)

Mechanical treatments and a 1½-2 years rest treatment would improve the ecological range condition to excellent on 210,750 acres while 70,250 acres would improve to good. Vegetation production would increase by 200-250 percent, the equivalent of a total forage increase of 61,156 livestock AUMs. See Appendix 2.2 for an explanation of AUM and condition computations.

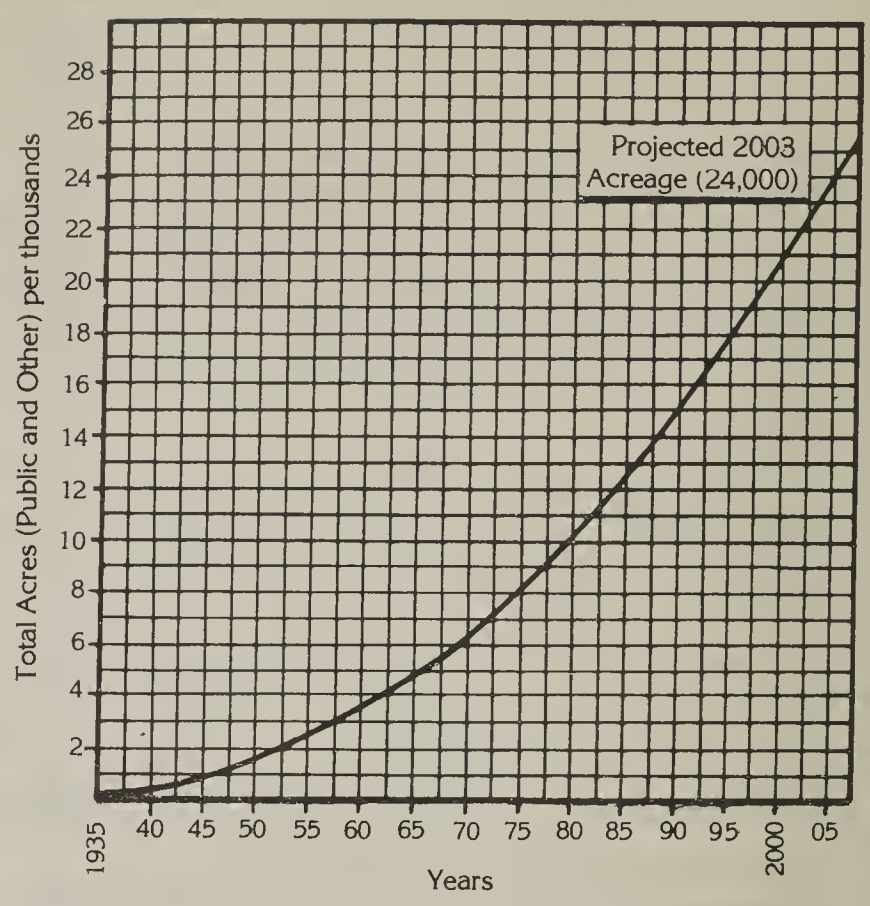
Construction of 1,000 water sources would result in the loss of 600 AUMs due to flooding and livestock concentrations around reservoirs, based on an average of 3 acres per reservoir and 5 acres per AUM.

The 1,000 additional water sources, 650 miles of properly located range management fences and the placement of insecticide devices/oilers and shade sources would improve the distribution of livestock although this positive impact has not been quantified.

Noxious weed control and grazing management would result in improvement of about 2,200 acres from its present poor ecological range condition to fair or good condition. Control would also prevent the infestation of an additional 3,080 acres (based on the rate of spread occurring in the Rock Creek area in Valley County since the introduction of leafy spurge in the 1930s, Figure 4.2). Infestations of other noxious weeds in the Havre Resource Area also would be controlled but the acreages of these infestations has not been determined. Without weed control, 5,280 acres would be infested with leafy spurge by 2003, reducing productivity and grazing availability of native vegetation up to 75 percent (*Leafy Spurge Symposium*, 1979).

Control of prairie dogs with rehabilitation measures on 1,100 acres would improve range condition and vegetation production in prairie dog towns and prevent the deteriorated range condition and loss of vegetation production on other areas that might become infested in the future. A total of 239,000 acres could be occupied by prairie dog towns by 2003 (see "Wildlife," Chapter 4). Control of prairie dogs and rehabilitation by mechanical treatments would increase forage production by 311 AUMs over the current situation and improve range from poor to good and excellent ecological range condition. (AUMs computations are as follows: current capacity of the 1,100 acres is estimated at 20 acres/AUM or less (about 55 AUMs total); the capacity following treatment at three acres/AUM or 366

FIGURE 4.2: PROJECTED LEAFY SPURGE SPREAD
ROCK CREEK AREA, VALLEY COUNTY



AUMs, a net gain of 311 AUMs. This 311 AUM difference is included in the totals for grazing systems and land treatments.)

CONCLUSIONS

This alternative would be of significant benefit to vegetation on 93 percent of public lands in the EIS area. Proper use allocations, rest and deferment treatments, land treatments, range facilities (including livestock exclosures) and noxious weed and prairie dog control would improve the ecological range condition and increase vegetation production on 572,918 acres; 1,176,320 acres would not improve significantly in ecological range condition but plant vigor, litter and water infiltration would improve due to proper use and grazing treatments.

The loss of 600 AUMs because of the construction and use of reservoirs would be insignificant. Rest treatments of 4-10 years followed by periodic use would improve 1,324 of acres of high value riparian, reservoir shoreline and saline seep vegetation. High value riparian zones not scheduled for 4-10 year rest (3,830 acres) would moderately benefit by periodic rest and deferment but this improvement in streambank condition cannot be quantified. Shoreline vegetation around 2,287 water sources would also be improved by an unquantified amount.

The long term allocation would increase livestock AUMs from the present 319,065 to 379,721; wildlife AUMs would increase from 20,538 to 25,734. This is a significant 25 percent increase. Non-consumptive allocations would increase at the same rate, from 339,603 AUMs to 423,455 AUMs. The ecological range condition would improve significantly in the long term

There would be no irretrievable or irreversible loss of vegetation resources in this alternative.

IMPROVEMENTS IN ECOLOGICAL RANGE CONDITION — ALTERNATIVE A

	Excellent Acres	Good Acres	Fair Acres	Poor Acres	Unclassified Acres
Present	14,832	1,035,208	623,022	6,803	69,373
Long Term	371,978	1,041,890	265,888	109	69,373

Livestock

The allocations in this alternative are based primarily on forage increases brought about by grazing systems in soil subgroups 3, 4 and 6 and mechanical treatments and grazing treatments in subgroups 1, 2 and 5. These allocations would maintain current levels of livestock use in the short term and would increase by 78,656 AUMs in the long term. The 78,656 AUMs would feed an additional 13,109 adult cattle for the typical 6 month grazing season or would be equal to an average of 1.5 additional months of grazing on public lands with present livestock numbers. For example, where the AUMs were used by yearlings which gain 1.75 pounds/day, a total of 5,505,885 additional pounds of red meat (live weight) would be produced (see Appendix 4.4). Moderate grazing use, such as that proposed, has been shown to provide heavier weaning weights, higher calf crops and higher value of calves produced per breeding cow than heavy grazing.

Present seasons of use would be maintained in the short term. More fall or winter use would result on some allotments in the long term because of the increased forage supplies. This would reduce the winter feeding period.

Rotation grazing treatments would increase the stress on livestock slightly on 275 allotments proposed for grazing treatments to reach 80 percent good ecological range condition. This impact would vary, depending on the level of current livestock production on a given allotment (see this section in "General Impacts"). Breeding success would be improved in large allotments, especially on allotments of 5,000 acres or more which would be sub-divided into pastures. This would affect 50 allotments totaling 530,090 acres. Forage increases resulting from grazing treatments are equal to 1,224,982 pounds of red meat production (live weight) (Appendix 4.4).

Mechanical treatments would result in an increased gain (per-acre basis) totaling 4,280,903 pounds (Appendix 4.4) and maintenance of gains on a per-animal basis. The negative impacts discussed in "General Impacts" would be insignificant.

Water sources, insecticide devices/oilers and shade sources would improve distribution and reduce livestock stress by alleviating the need to trail long distances from water, shade and rubbing sources to feeding areas. Additional pasture fences would also improve livestock distribution but would contribute to stress when animals were moved from pasture to pasture. On the allotments affected by the 28 miles of high value riparian zone fences, livestock would be somewhat restricted from free access to water and shade; increased stress would result, although additional water sources, shade and offsite land treatments would compensate for this loss in most cases.

Forage increases from prairie dog control and mechanical rehabilitation (in combination with proper use grazing and grazing treatments) would result in 21,770 more pounds of red meat (live weight) production. Leafy spurge control, proper use and grazing treatments would increase red meat (live weight) production 23,100 pounds (Appendix 4.4). Production increases because of prairie dog and noxious weed control are included in totals given for grazing and mechanical treatments as the control alone (without the other management practices) would not result in the projected increases.

CONCLUSIONS

This alternative would increase red meat (live weight) production significantly by 5,505,885 pounds. Grazing systems on 275 allotments and riparian exclosures on 28 miles could cause additional livestock stress. The loss in per-animal gain would be offset by increased overall red meat production resulting from mechanical and grazing treatments.

Livestock stress caused by trailing long distances to water, shade and rubbing sources would be reduced or eliminatd by new water sources, artificial shade sources and insecticide devices/oilers. The significant increases in forage would result in 13,109 additional cattle grazing for 6 months or 1.5 additional months of grazing with current numbers or combinations of increased numbers and grazing season.

There would be no irretrievable or irreversible loss of livestock resources in this alternative.

Wildlife

BIG GAME (DEER, ANTELOPE, ELK)

A 100 percent increase in deer and antelope populations is projected in the long term in this alternative because of grazing treatments and range developments (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication; Appendix 4.5). An increase of vegetation equivalent to 5,196 AUMs (from 20,538 to 25,734 AUMs or 25 percent) would be available to help satisfy the forage needs of the projected increases of 8,000 deer and 4,750 antelope.

Grazing treatments with spring rest or deferment would improve the quality of big game forage. Mechanical treatments would provide additional forage (especially forbs) to big game also.

Rest of high value streamside riparian vegetation and saline seeps would provide additional forage and cover for big game (each mile of riparian habitat zone contains 24.24 acres). High value streamside riparian vegetation in satisfactory condition would increase from 58 miles to 86 (1,406 to 2,085 acres). Through grazing treatments with rest or deferment and proper placement of range facilities and land treatments proposed in this alternative, it is thought that another 5 miles (121 acres) would improve to satisfactory condition also (Jeffery Dose, 1980, BLM, Personal Communication). Thus 91 miles (2,206 acres or 49 percent) of the high value riparian vegetation would rise to satisfactory condition, an increase of 57 percent over the present situation. However, 95 miles (2,303 acres or 51 percent) of the high value riparian vegetation would remain in unsatisfactory condition.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE, RING-NECKED PHEASANT)

In the long term additional residual vegetation from rest or deferred grazing treatments would help provide cover and food for possible increases in upland game birds. Mechanical treatment would also add food and cover to the grouse habitat. Rest of the high value streamside riparian vegetation and saline seeps would provide additional food and cover for sharp-tailed grouse and ring-necked pheasants.

WATERFOWL

Rest or deferred grazing allotments would have the potential of supporting 63,600 ducks annually, an increase of 28,800 ducks (or 83 percent) over the present situation. These figures are based on calculations extrapolated from Gjersing (1971) and Mundinger (1975) and are presented in Appendix 4.6.

Additional cover would be available to waterfowl (especially puddle ducks) on mechanically treated areas within 0.5 miles of potholes and reservoirs. The rest of the high value streamside riparian vegetation and saline seeps would increase the quality and/or quantity of food and cover used by waterfowl in these areas; however, production cannot be quantified.

New water sources proposed under this alternative would provide approximately 3,000 surface acres of additional water and about 840 additional goose nesting islands. Under grazing treatments with rest or deferment, these new water sources would have the potential of annually producing 11,000 additional ducks (32 percent) over the present situation and 2,350 additional Canada geese (43 percent) in the long term. The figures are based on calculations extrapolated from Gjersing (1971), Mundinger (1975) and McCarthy (1973) and are presented in Appendix 4.6, too.

NONGAME

Grazing treatments with rest or deferment would provide sufficient nesting and yearlong residual cover for nongame on 1,621,740 acres. Additional cover and forage would be available to nongame on the mechanically treated acres. Rest of high value streamside riparian vegetation and saline seeps would also provide additional food and cover to a wide variety of nongame wildlife.

Allotment boundary, pasture and livestock exclosure fences would provide additional perching sites for many nongame birds such as hawks, eagles, horned larks and lark buntings.

Shore bird populations described by Rundquist (1973) would increase with the improvement of 1,640 miles of shorelines around reservoirs and natural potholes. (The average size of a reservoir is 3 acres with a shoreline of about .243 miles. This figure x 2,298 existing reservoirs = 550 miles. The average size of a natural pothole is 5 acres with a shoreline of about .31 miles. This figure x 3,472 existing potholes = 1,090 miles. The number of reservoirs and potholes was provided from BLM project files and aerial photographs.) The new water sources would provide an additional 243 miles of shoreline vegetation for shore birds. (The average shoreline is .243 miles x 1,000 new water sources = 243 miles.)

The 18 prairie dog towns presently occupy 1,715 acres, ranging in size from 1 to 288 acres (BLM, Inventory Files, 1979). This alternative limits the size of prairie dog towns to 40 acres or under. The total acreage would be reduced from 1,715 to 615 acres in the long term, eliminating 1,100 acres (64 percent) of the present prairie dog towns. This reduction would decrease the nesting burrows of the burrowing owl and the open nesting areas of the mountain plover, both species of special concern to the Montana Department of Fish, Wildlife and Parks (1979). Cover provided by the burrows and the food source presented by prairie dogs would be also reduced for the more than 20 species associated with prairie dog towns (Campbell and Clark, 1980). This would limit the potential habitat of the endangered black-footed ferret though none are known to exist here.

FISHERIES

In the long term 11 of 27 fisheries reservoirs would be rested from livestock grazing. The riparian vegetation would improve, reducing shoreline erosion by wave action. The additional vegetation around shorelines would also lower the amounts of sediment that is deposited in reservoirs by slowing water velocity and allowing some of the sediment to collect in the vegetation along the shores. Of the remaining 16 unfenced reservoirs, it is estimated that 8 viable fisheries would be lost because of accelerated sedimentation (Jeffery Dose, 1980, BLM, Personal Communication; BLM Inventory File 6670). About 20 new fisheries would be created in this alternative, increasing the number of viable fisheries from 27 to 39 or 44 percent in the long term.

CONCLUSIONS

Grazing treatments with rest or deferment proposed on 93 percent (512 AMP allotments covering 1,621,740 acres) of the EIS area would improve the quality and quantity of forage and cover for wildlife species. Additional deferment on allotments in predominately poor or fair ecological range condition, the use of crested wheatgrass as early use pastures, improved distribution of livestock by the proper placement of new water sources, management fences, shade sources, salt and insecticide devices/oilers would improve the quality of forage and cover used by wildlife.

Mechanical treatments, mainly on clubmoss-blue grama ranges, and the resting by fencing of high value streamside riparian habitat and saline seeps below reservoirs would increase wildlife forage and cover also.

A moderately significant impact would be the increased forage allocation of 5,196 AUMs (to 25,735 AUMs overall) to wildlife. This would be a 25 percent increase over the present forage allocations. A significant increase in big game is projected in this alternative, a 100 percent increase or an additional 8,000 deer and 4,750 antelope.

A significant increase in residual vegetation from rest and deferment and grazing treatments would increase upland game bird and nongame wildlife populations. An annual increase in duck production of 39,800 (114 percent) from rest or deferment on present and new water sources would also be a significant impact as would an increase of 2,350 Canada geese (43 percent) from the 840 proposed goose nesting islands.

Fisheries reservoirs would increase significantly in this alternative from 27 to 39 or 44 percent. There would be significant increases in high value streamside riparian vegetation in satisfactory condition from 58 to 91 miles or 57 percent and 575 acres of riparian vegetation in saline seeps below reservoirs.

A moderately significant reduction of 1,100 acres of prairie dog towns (from 1,715 to 615 acres; 64 percent) would occur in this alternative while the number of prairie dog towns remained the same.

There would be no irretrievable or irreversible loss of wildlife resources in this alternative.

Recreation, Wilderness and Visual Resources

RECREATION

Proposals in Alternative A would double big game populations (Appendix 4.5) and associated big game hunting opportunities in the long term. Waterfowl hunting opportunities would also improve with a potential 114 percent increase in duck and 43 percent increase in Canada geese populations. Short term impacts to hunting would be negligible.

The proposed fencing of 11 fishing reservoirs would increase fishing opportunities and fisherman days in the long term. The combination of fencing and the new water sources proposed in this alternative would result in a net long term gain of 12 fishing reservoirs (see "Wildlife," Chapter 4). This would be a 44 percent long term increase in fishing opportunities in reservoirs in the EIS area. Short term impacts to fishing would be negligible.

Cross country access would be decreased by new fences but the proposed cattle guards would eliminate some of this impact. Surface disturbances from mechanical treatments would reduce ORV travel opportunities.

A 64 percent reduction in prairie dog town acreage would reduce prairie dog hunting opportunities.

WILDERNESS

Because of the constraints of the Wilderness IMP, new range projects or mechanical treatments must be non-impairing to wilderness suitability. No significant impacts to wilderness suitability would occur.

VISUAL RESOURCES

Mechanical treatments and range developments would be proposed on approximately 16 percent of public lands located primarily in (VRM) Class III and IV landscapes. Individual projects would meet class guidelines and would be distributed across the EIS area. No preponderance of surface disturbances would be anticipated in any given area. Fencing selected riparian zones and reservoirs would increase vegetation and improve scenic quality on some sites. Grazing systems would have the potential to improve scenic quality through increased vegetation and improved watersheds, primarily in Class IV landscapes.

CONCLUSIONS

Big game hunting opportunities would double and waterfowl hunting opportunities would increase significantly. There would be a 44 percent long term increase in reservoir fisheries. The fences and mechanical treatments proposed would create a moderate negative impact because of reduced cross country access and ORV travel.

Reduction of prairie dog towns by 64 percent would significantly reduce recreational shooting opportunities. The impacts to wilderness suitability would be insignificant. No significant impacts to visual resources would occur. There would be no irretrievable or irreversible loss of recreation, visual or wilderness resources in this alternative.

Cultural Resources

The proposals in this alternative would affect 285 sites. This would be a relatively insignificant consequence because mitigating measures would preserve the physical evidence and information from these sites.

Any cultural sites inadvertently destroyed in this alternative would be irretrievably and irreversibly lost.

CULTURAL IMPACTS SUMMARY — ALTERNATIVE A

Proposed Action	Acres Disturbed	Potential Sites Encountered	Probable Sites Avoided	Remaining Sites Impacted
Mechanical Treatments	281,000	2,810	2,529	281
Water Developments	4,000	40	36	4

Social and Economic Impacts

RANCH ECONOMIC IMPACTS

The overall short term impact on ranch income in this alternative would be minimal. This is because the only identifiable change in AUMs would be the temporary disruption of grazing as mechanical treaments are applied or grazing systems implemented and the 4-10 year loss of 554 AUMs from the fencing of riparian zones, saline seeps and reservoirs. These losses would represent a significant impact, however, to a few individual operators when their land was out of production.

In the long term 395 ranch operations would show increases while 163 would have no change. These increases are shown in Appendix 4.7 by representative size category. The average affected operation would receive about a 34 percent increase in BLM AUMs or about an 8 percent increase in total ranch grazing. The average change in net annual income for the representative livestock categories ranges from an increase of $300 on small operations (11 percent of their current livestock income) to an increase of $3,800 on very large operations (6 percent of their current livestock income). Total increases in gross annual livestock sales and in net annual income to all ranch operations affected would be approximately $3,208,000 and $495,000, respectively, an increase of 5.8 percent above the current livestock income for all ranches in the study.

Greater income because of increases in BLM forage would improve the economic well-being of operators in a number of ways. Those who might have diverted funds for allowance for depreciation, deferred maintenance or deferred principal and interest payments would be in a position to use more funds for these purposes. Increased income might also be used to raise the living standards of some operators.

In this alternative total permit values would increase by $7,804,000 in the long term, 25 percent of the present value. These increases would have a beneficial effect on ranchers' borrowing capacity and the sale value of affected ranches. There would be no short term change. The long term increase in ranch employment would be the full time equivalent of approximately 32 employees, an increase of 18 percent over the current number.

RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

There would be little or no impact on recreation/wildlife related earnings and employment in the short term in this alternative. In the long term recreation/wildlife related direct expenditures for the intensive study area would increase by $136,000 annually, 100 percent more than the present level. These expenditures would generate approximately $37,000 in direct and indirect earnings annually and are estimated to result in the employment of 4 people (Appendix 3.14).

SOCIAL IMPACTS

This alternative would have both positive and negative effects on the attitude toward BLM. The increased vegetation made available for livestock, wildlife and watershed would produce favorable attitudes from ranchers, those associated with the ranching industry, recreationists and environmentalists. This alternative also proposes a large number of AMPs, however, which would mean greater governmental presence and control in a basically conservative ranching community. To the extent that AMPs improve range condition, carrying capacity and livestock water availability and do not infringe too much on the way the operator manages his ranch, the effect on his attitudes would be positive.

The social well-being of approximately 527 ranch families (assuming 1.33 families per operation on the 395 affected operations) would be improved in the long term. Thirty of these operations fall into the small livestock/small cash crop category where the positive effects would be greatest.

REGIONAL ECONOMIC IMPACTS

Appendix 4.8 shows the impact on the intensive study area output, earnings and employment of increased livestock sales, range development construction, recreationist expenditures and government employment. Impacts are shown in the short and long term. In the short term the largest effect on earnings would be from increased construction. The total direct and indirect earnings generated during the construction period would be $771,000 annually. The largest effect in the long term on earnings would be from increased livestock sales. Increased earnings to the intensive study area from this activity would amount to $1,643,000 annually while gross intensive study area output resulting from increased livestock sales would be $6,845,000 annually.

Total intensive study area employment would increase by 107 people in the short term and 186 people in the long term. Total intensive study area earnings would increase by $1,385,000 annually in the short term and $2,087,000 annually in the long term, an increase of 1.0 percent above the current total.

In this alternative assessed valuation for livestock in the long term would increase by an estimated $3,359,000 in the intensive study area. Property taxes would increase by $54,000 annually (10 percent above the current level of farms/ranches using public land). There would be no short term change.

CONCLUSIONS

Income for 395 ranch operations would increase by $495,000 annually (an increase of 5.8 percent over the current livestock income for all ranches in the study) in the long term. Permit values would increase by 25 percent and ranch employment by 18 percent. The social well-being of approximately 527 ranch families (including the families on 30 small livestock/small cash crop operations) would be improved by the increased income and permit value. These increases would be moderately significant.

Changes in recreation/wildlife related earnings (+ $37,000) and employment (+ 4 positions) due to increased expenditures for recreation would be insignificant to the total economy of the intensive study area.

The overall impact on the attitudes of ranching oriented and environmental/recreation oriented residents would be positive in this alternative, although its selection would result in greater governmental presence and control.

The short and long term direct and indirect increases of 1 percent or less in intensive study area annual earnings and employment would be insignificant overall but the increases in employment might be significant locally in towns such as Glasgow or Malta. The increase in property taxes would have insignificant contribution to the total property tax base.

There would be no irretrievable and irreversible loss in this alternative.

ALTERNATIVE B

This alternative would result in the following vegetation allocations:

	Short Term AUMs	Long Term AUMs
Livestock	319,065	366,846
Wildlife	20,538	23,758
Non-consumptive	339,603	390,604
Totals	679,206	781,208

AMPs would only be developed for 70 high priority allotments (covering 455,009 acres) and revised on the current 93 AMP allotments (558,986 acres) in this alternative. The objectives for range management are the same as for Alternative A but this alternative proposes scaled-down activities. For example, 349 additional allotments (607,745 acres) were proposed for AMP development under Alternative A; they are considered only as potential AMPs in this alternative.

Fencing 16 miles of high quality streamside riparian zones would provide continuous rest for 4-10 years on 15 percent (388 acres) of the total only within the area covered by AMPs. After vegetation in fenced areas had improved to within 90 percent of optimum streambank cover, rotational or rest treatments would be applied.

Riparian vegetation on 370 seeps, averaging 1 acre in size, and around 7 fishing reservoirs (36 acres) would also be rested continuously for 4-10 years. Following the initial rest, rotational or rest grazing treatments would also be applied.

Grazing would be periodically deferred until peak flowering time for key plant species on 51 allotments (250,144 acres) slated for proposed AMPs and on 20 allotments (156,195 acres) that now have AMPs. In both cases at least 50 percent of the acreage on these allotments are in fair or poor condition. The remaining 19 allotments (204,865 acres) proposed for AMP development and 73 allotments (402,791 acres) with existing AMPs would all be considered for rest, deferment or rotational grazing treatments to attain good or excellent ecological range condition on 80 percent of their area or to meet other resource objectives.

Mechanical treatments might be done on any of 163 allotments with proposed or current AMPs but would primarily involve 127 allotments (749,243 acres). Mechanical treatments would be done on a total of 175,000 acres, primarily clubmoss-blue grama sites that fall within soil subgroups 1, 2 and 5.

About 300 miles of pasture and allotment boundary fences would be needed to support the grazing treatments. An additional 106 miles of fences would be needed to exclude livestock from riparian zones. About 450 new water sources would be developed and 30 cattle guards set in place. An undetermined number of shade sources for livestock and insecticide devices/oilers would also be built.

Chemical treatment of 2,200 acres of noxious weeds and 1,100 acres of prairie dog towns would occur. The total cost of range improvements for this alternative would be $8,401,500.

Watershed

Development and revision of AMPs would improve watershed condition by establishing proper-use stocking rates, rest and deferment grazing treatments and better livestock distribution. Grazing treatments and livestock management would decrease sediment yield from 1,889 acre-feet/year initially to 1,223 acre-feet/year in the long term. Sediment yield reductions would be greatest on soil subgroups 3, 4, 10 and 11. Water yield would be decreased from 79,084 acre-feet/year initially to 57,047 acre-feet/year in the long term (Table 4.4) with reductions being the greatest on soil subgroups 3, 4, 6, 10, 11 and 18.

Exclosing riparian vegetation, saline seeps and 7 fishing reservoirs from livestock grazing would result in lowering sediment yield from 2.9 acre-feet/year initially to 0.12 acre-feet/year in the long term while water yield would be reduced from 96.1 acre-feet/year initially to 29.78 acre-feet/year in the long term. Water quality would also improve with reduced sediment loading of surface waters.

Mechanical treatments on soil subgroups 1, 2, 5, 8, 9, 10, 11 and 18 would reduce sediment yield from 537 acre-feet/year to near zero in the long term from 175,000 acres of treatments. Water yield would be reduced from 21,172 acre-feet/year initially to near zero in the long term. Water quality would improve with reductions in sediment yield.

Range facilities would increase sediment yield from 0.2 acre-feet/year initially to 0.23 acre-feet/year in the long term. Water yield would not change in the long term from 9 acre-feet/year while water quality would decrease slightly due to runoff and erosion resulting from the development of facilities.

Development of water sources would cause soil disturbances on 1,800 acres, 1,350 acres of which lie upstream of dams and would not contribute sediment to downstream water courses. This would leave 450 acres of disturbed soil on dam and borrow areas from which erosion would contribute insignificant quantities of sediment to reservoirs and stream channels. Water yields to downstream users would be reduced slightly by the construction of reservoirs. Approximately 3,800 acre-feet of water would be held in storage in the 450 new reservoirs in the EIS area. This stored water represents less than 1 percent of the annual flow of the Milk River. Water quality would not be affected by construction. Development of new reservoirs would have an insignificant impact on watershed condition.

Consumptive water use by livestock would increase from 3,523 acre-feet/year initially to 4,051 acre-feet/year in the long term (Table 4.4) based on an initial vegetation allocation of 319,065 AUMs to livestock and a long term allocation of 366,846 AUMs.

TABLE 4.4: SUMMARY OF WATERSHED IMPACTS BY TREATMENTS AND FACILITIES

ALTERNATIVE B

Element	Sediment Yield (ac-ft/yr)		Water Yield (ac-ft/yr)		Water Quality	Consumptive Water Use by Livestock (ac-ft/yr)	
	Initial	Long Term	Initial	Long Term		Initial	Long Term
Grazing Treatments	1,889.3	1,223.00	79,084.7	57,047	+		
Exclosures	2.9	.12	96.1	29.78	+		
Mechanical Land Treatments on 175,000 acres	537.0	0	21,172.3	0	+		
Range Facilities	0.2	.23	9.0	9.0	0		
Water Developments	I	I	I	I	0		
Chemical Treatments							
—Noxious Weeds	6.8	1.5	266.2	93.0	+		
—Prairie Dogs	3.9	.8	133.1	46.5	+		
Non-Treatment	2,237.1	2,233.0	88,197.4	88,197	0		
Totals for Existing and Proposed AMPs	4,676.2	3,459	188,958.8	145,422	+	3,523	4,051

I - Insignificant
- - Not applicable in this Alternative

+1 - Increase Water Quality
0 - No change in Water Quality
-1 - Decrease Water Quality

Source: BLM, 1980

Chemical treatments to control noxious weeds would reduce grazing pressure on nearby non-infested range. Relieving grazing pressure on these areas would reduce sediment yield from 6.8 acre-feet/year initially to 1.5 acre-feet/year in the long term after noxious weeds are eliminated. Water yield would also be reduced from 266.2 acre-feet/year initially to 93 acre-feet/year in the long term.

Control of prairie dogs and the rehabilitation of prairie dog towns would reduce sediment yields from 3.9 acre-feet/year to 0.8 acre-feet/year in the long term while water yield would decrease from 133.1 acre-feet/year initially to 46.5 acre-feet/year in the long term.

Chemical treatment of noxious weeds and prairie dogs would improve water quality by increasing the vegetation cover that promotes infiltration and reduces runoff and erosion and sediment loading of surface waters.

CONCLUSIONS

This alternative would reduce sediment and water yields significantly (Table 4.4). On 1,013,995 acres of public lands, sediment yield would be reduced from 4,676 acre-feet/year to 3,459 acre-feet/year, a decrease of 1,217 acre-feet/year. Water yield would decrease in the long term from 188,958 acre-feet/year to 145,422 acre-feet/year, a decrease of 43,536 acre-feet/year.

Water quality would improve significantly in the long term with reductions in suspended sediment loading of water bodies. Water consumption by livestock, 4,051 acre-feet/year in the long term (Table 4.4), would be insignificant compared to the water presently contained in stockwater reservoirs.

Increases in vegetation production would result in allocating 50 percent of the increase to non-consumptive users, from the equivalent of 339,603 AUMs to the equivalent of 390,604 AUMs. This would provide additional residual vegetation and litter cover necessary for watershed protection. Increased cover and litter promotes water infiltration and reduces runoff and erosion (see "Vegetation", Chapter 3).

There would be no irretrievable or irreversible loss to soil or water resources in this alternative.

Vegetation

Current proper use vegetation allocations would either continue or be adjusted to reach proper use in the short term. Plant vigor, production and range condition would be maintained in the short term, based on trend studies of the 93 current AMPs and range condition by AMP status (Tables 3.9-3.13). Proper use allocations and improved grazing management in the long term would ensure plant maintenance or improvement on 163 current and 70 proposed AMPs. Moderate use allocations on 349 potential AMP allotments without improved grazing management would result in the continued overuse by livestock of preferred plants and areas in some allotments.

Exclosure of high value riparian zones for 4-10 years followed by livestock use on a rotation basis (Appendix 2.1) in the long term would improve riparian vegetation to 90 percent of optimum (Appendix 3.9) and meet resource objectives (Appendix 1.2). About 2,206 acres of high value riparian vegetation in current and proposed AMPs would benefit from rest and deferment grazing treatments and the proper location of range facilities. Reduced rubbing damage by livestock to woody species and lighter grazing for shorter periods would occur, improving vigor, production and composition of desirable grass species but would not significantly increase willow^{-} or cottonwood. About 1,915 acres of high value riparian vegetation would not receive rest or deferment treatments and would decline or remain static in range condition.

Reservoir and saline seep exclosures (totaling 406 acres) would improve production of shoreline vegetation, especially deep-rooted species such as willow and cottonwood and salt-tolerant plants such as tall wheatgrass. Periodic grazing treatments (after 4-10 years) would maintain the vigor of these plants. Vigorous plants would utilize the extra moisture in saline seep exclosures, controlling seeps and preventing the loss of desirable plants that are not salt-tolerant. Shoreline and saline seep vegetation surrounding about 1,359 unfenced reservoirs and pits would improve slightly in AMP allotments due to rest and deferment treatments and construction of more water sources. These would result in lighter use for shorter periods in livestock concentration areas. Vegetation around 932 reservoirs in allotments unscheduled for AMPs would not improve.

IMPROVEMENTS IN ECOLOGICAL RANGE CONDITION — ALTERNATIVE B

	Excellent Acres	Good Acres	Fair Acres	Poor Acres	Unclassified Acres
Present	14,832	1,035,208	623,022	6,803	69,373
Long Term	218,941	1,102,348	355,574	3,001	69,373

Rest and deferment treatments would continue on AMP allotments and are proposed for 70 allotments. These would periodically exclude livestock use from woody types in pastures reducing damage from rubbing to woody species and improving vigor and production of understory species.

Periodic deferment until the flowering of key species would allow plant carbohydrate reserves to be restored and would contribute to improved vigor and production of forage plants. Deferment and rest treatments, applied as necessary to accomplish desired objectives on the 163 AMP allotments, would bring about the most positive results on soil subgroups 3, 4, 6, 8, 10, 15, 16, 17 and 19. Range condition and vegetation production would improve on 172,912 acres in these subgroups as a result of grazing treatments. About 72,860 acres would improve from good to excellent range condition, 96,250 acres from fair to good and 3,802 acres from poor to fair range condition. Vegetation production, in terms of livestock forage, would increase by 10,555 AUMs. Range condition would not improve on 607,745 acres (34.7 percent of public lands) suitable but unscheduled for AMPs in this alternative. The 89 potential AMP allotments unscheduled for AMPs which are currently in predominantly fair ecological range condition would continue to be grazed season long and eventual downward trends in preferred areas would be likely. Overall trend would depend on climate conditions and operator management.

About 131,250 acres of land proposed for mechanical treatments would improve to excellent ecological range condition while the remaining 43,750 treated acres would improve to good condition. Livestock forage would increase by 37,422 AUMs. (See Appendix 2.2 for an explanation of AUM and condition computations.)

Construction of 450 reservoirs would cause the loss of 270 AUMs because of flooding and the concentration of livestock on shoreline vegetation, based on an average of 3 acres per reservoir and 5 acres per AUM.

Water developments, management fences, shade sources, insecticide devices/oilers and the proper location of salt would improve the distribution of livestock. This would relieve grazing pressure on floodplains and riparian zones which can occur even under proper use because of the preference of cattle for these areas. These benefits would not occur on the 349 potential AMP allotments not proposed for AMPs.

Leafy spurge would be controlled, improving 2,200 acres from the present fair and poor ecological range condition to good and preventing the probable infestation of an additional 3,080 acres as discussed in Alternative A. Prairie dog control would reduce the current towns by 1,100 acres, increasing forage production by 311 AUMs and preventing the loss of 35,850 AUMs because of the potential uncontrolled spread of prairie dogs. On allotments not scheduled for AMPs, proper use grazing, without rest or deferment, might not be effective in rehabilitating prairie dog towns following control.

CONCLUSIONS

Proper stocking, rest and deferment, mechanical treatments and noxious weed and prairie dog control would improve ecological range conditions to 79 percent good and excellent overall. This is compared to 63 percent at present, although only 58 percent of the public land would be managed under AMPs (excluding "unclassified" acres). While the primary range management objective of 80 percent good or better ecological range condition would not necessarily be met on the 349 potential AMP allotments, the overall improvement in range condition would amount to achieving 99 percent of this objective.

Conditions would remain static or improve slightly except in livestock concentration areas (which would decline or remain static) on the 349 potential AMP allotments due to proper use allocations and noxious weed and prairie dog control. Forage production would increase by 51,001 livestock and wildlife AUMs, a significant increase (15 percent) overall. Ecological range condition would improve on 347,912 acres and would not change on 1,401,326 acres.

Rest treatments of 4-10 years would improve 388 acres of high value riparian zones and 406 acres of shoreline and saline seep vegetation. The loss of 270 AUMs due to reservoir construction and subsequent livestock use would be insignificant. About 2,206 acres of high value riparian zones unscheduled for 4-10 year rest treatment would benefit moderately by rest and deferment treatments. One thousand nine hundred and fifteen acres of high value riparian would not have a change in management and would either decline or remain static in ecological condition. Shoreline vegetation would be improved around 1,359 water sources and would remain static or decline around 932 sources.

The long term allocation would increase livestock AUMs from the present 319,065 to 366,846; wildlife AUMs would increase from 20,538 to 23,758 and nonconsumptive AUMs from 339,603 to 390,604 AUMs.

While range condition improvements would be highly significant on affected allotments, the overall improvement would be of moderate significance, as is shown below.

There would be no irretrievable or irreversible loss of vegetation resources in this alternative.

Livestock

Proper use grazing levels would provide for sustained forage production and would also lead to high livestock production. Weaning weights, calf crops and cow weights at the end of the grazing season would be maintained or improved. In the long term current use levels would continue on all allotments not proposed for AMPs and would increase by 26 percent on the 93 present AMPs. Current use would increase 28 percent on the 70 proposed AMPs. A total increase of 47,781 AUMs would result, which would feed an additional 7,964 adult cattle for the typical 6 month grazing season or would be equal to an average of 1.6 additional

months of grazing in the affected allotments. This increase would allow an increase in livestock production of 3,344,670 pounds (Appendix 4.4). The 349 potential AMP allotments would not have a long term increase in livestock production.

The present seasons of use would be maintained, causing no new impacts to livestock. In the long term grazing seasons might be extended on AMP allotments to use the increased forage. This would apply only to the 163 current and proposed AMPs which produce 56 percent of the forage on public lands in the area. Extending the grazing season could reduce the winter feeding period. The remaining 349 potential AMP allotments would not benefit.

Stress due to moving livestock would slightly increase on the present and proposed AMPs. Reliable spring forage and cover for young calves would be provided in rest systems. The remaining allotments would not have a change in their grazing systems and no identifiable change in livestock production would occur. Of the 70 proposed AMPs, 42 are greater than 5,000 acres; livestock breeding success would be improved on these allotments by fencing into pastures. Grazing treatments would increase forage supplies to provide for 738,832 pounds of increased red meat (live weight) production.

The effects of mechanical treatments on livestock production for the present and proposed AMPs would be the same as in Alternative A. There would be no impact to the potential AMP allotments. Livestock production would increase from mechanical treatments which would increase quantity, nutrition and palatability of forage resulting in a production increase of 2,605,838 pounds. Leafy spurge and prairie dogs would be conrled; these impacts would be the same as discussed in Alternative A.

Water developments, shade sources, insecticide devices/oilers and management fences would improve livestock distribution on the 163 current and proposed AMP allotments. Where the 16 miles of high value riparian habitat are fenced, livestock in the affected allotments would be somewhat restricted from water and shade. Additional water sources, shade and land treatments in the uplands would compensate for this impact in most cases.

CONCLUSIONS

The overall impact of this alternative would be beneficial to livestock production on the 163 current and proposed AMPs. There would be no identifiable change in the remaining 349 potential AMP allotments. Possible increases in livestock stress would be offset by the average 27 percent increase in forage production on AMP allotments.

Red meat production would increase by 3,344,670 pounds (live weight) in the long term. Higher forage production would result in increases in livestock numbers and/or lengthening of the grazing season on the affected allotments.

There would be no irretrievable or irreversible loss of livestock resources in this alternative.

Wildlife

BIG GAME (DEER, ANTELOPE, ELK)

A 100 percent increase in deer and antelope populations is projected in the long term because of the grazing treatments and range developments proposed on 163 AMP allotments covering 1,013,995 acres (Richard Trueblood, 1980 Montana Department of Fish, Wildlife and Parks, Personal Communication; Appendix 4.5). Population increases could take place on non-AMP allotments but additional forage would not be allocated to livestock or deer and antelope in these allotments. An increase of 3,220 AUMs (from 20,538 to 23,758 AUMs or 16 percent) would be available to satisfy the forage needs of the additional 4,000 deer and 2,375 antelope on AMP allotments. This would be a 50 percent increase in big game overall.

Grazing treatments with spring rest or deferment would improve the quality of big game forage on the 163 AMP allotments. On the 741 non-AMP allotments, however, big game forage would not improve in quality and the present competition for forage during the winter, if any, would remain. Additional forage (especially forbs) would be available to big game on the mechanically treated areas.

Rest by fencing 16 miles (388 acres) of high value streamside riparian vegetation and 370 one acre saline seeps below reservoirs would provide additional forage and cover for big game. High value streamside riparian vegetation in satisfactory condition would increase from 58 to 74 miles (1,406 to 1,794 acres). Thus, 74 miles (1,794 acres or 40 percent) of the high value riparian vegetation would be in satisfactory condition, an increase of 28 percent. However, 112 miles (2,715 acres or 60 percent) of high value riparian vegetation would remain in unsatisfactory condition.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE, RING-NECKED PHEASANT)

In the long term additional residual vegetation from rest or deferred grazing treatments on the 163 AMP allotments would help provide cover and food for any increase in upland game birds. No additional residual vegetation would be available in the non-AMP allotments so no increase in upland game bird populations would be expected there.

Additional food and cover would be available to upland game birds (especially sharp-tailed and sage grouse) on the mechanically treated acres. Rest by fencing high value streamside riparian vegetation and saline seeps below reservoirs would provide additional food and cover for sharp-tailed grouse and ring-necked pheasants also.

WATERFOWL

Rest or deferment on 1,013,995 acres would have the potential of producing 37,400 ducks annually, an increase of 2,600 ducks (or 8 percent). These figures are based on calculations extrapolated from Gjersing, (1971) and Mundinger (1975) and are presented in Appendix 4.6. Additional cover would be available to waterfowl (especially puddle ducks) on mechanically treated areas within 0.5 miles of potholes and reservoirs.

The vegetation response from the rest on high value streamside riparian vegetation and saline seeps would increase the quality and quantity of food and cover used by waterfowl in these areas but increased production cannot be quantified.

New water sources proposed in this alternative would provide about 1,350 surface acres of additional water and about 378 additional goose nesting islands. Under grazing treatments with rest or deferment, these new water sources would have the potential of annually producing 5,000 additional ducks (or 14 percent) and 1,060 additional Canada geese (19 percent) in the long term. The figures are based on calculations extropolated from Gjersing (1971), Mundinger (1975) and McCarthy (1973) and are presented in Appendix 4.6, too.

NONGAME

Grazing treatments with rest or deferment would provide sufficient nesting and yearlong residual cover for nongame. Additional cover and forage would be available to nongame on the mechanically treated acres. Rest by fencing high value streamside riparian vegetation and saline seeps would provide food and cover to a variety of nongame wildlife, also.

Range management and livestock exclosure fences would provide additional perching sites for many nongame birds.

Shore birds would increase with the improvement of the present reservoir shorelines as described in Alternative A. Moreover, new water sources would provide an additional 110 miles of shoreline vegetation for shore birds Appendix 2.1. (The average shoreline is .243 miles x 450 new water sources = 110 miles).

The impacts to prairie dogs are the same as discussed in this section in Alternative A.



FISHERIES

In the long term 7 of 27 fishing reservoirs would be rested by fencing from livestock grazing. This would have the same impacts as discussed in Alternative A. Of the 20 remaining fisheries reservoirs, however, it is estimated that 11 would be lost as viable fisheries because of accelerated sedimentation (Jeffery Dose, 1980, BLM, Personal Communication; BLM Inventory File 6670). About 10 new fisheries reservoirs would be created in this alternative, decreasing the number of viable fisheries from 27 to 26 or 4 percent in the long term.

CONCLUSIONS

Forage and cover would improve on 58 percent (163 AMP allotments covering 1,013,995 acres) of the EIS area. A moderately significant increase of 3,220 AUMs or 16 percent in allocations to wildlife would occur in this alternative. A significant increase of 100 percent in big game is projected on 163 AMP allotments producing an additional 4,000 deer and 2,375 antelope. This would be a 50 percent increase in big game overall.

A moderately significant increase in residual vegetation from rest and deferment of the 163 AMP allotments and 175,000 acres of mechanical treatments would increase populations of upland game birds and nongame wildlife. Rest and deferment on present and new water sources would allow a moderately significant annual increase of 7,600 ducks (22 percent). The 378 proposed goose nesting islands in water sources would lead to a moderately significant increase of 1,060 Canada geese (19 percent).

Significant increases in high value streamside riparian vegetation in satisfactory condition from 58 to 74 miles (40 percent) and 370 acres of riparian vegetation in saline seeps below reservoirs would occur in this alternative.

Fisheries reservoirs would drop by one (from 27 to 26), an insignificant decrease. A moderately significant reduction of 1,100 acres of prairie dog towns (1,715 to 615 acres or 64 percent) would take place in this alternative while the number of prairie dog towns would remain the same.

There would be no irretrievable or irreversible loss of wildlife resources in this alternative.

Recreation, Wilderness, Visual Resources

RECREATION

The proposals in this alternative would double big game populations (Appendix 4.5) and associated hunting opportunities on the affected allotments. There would also be a 22 percent increase in duck and 19 percent increase in Canada geese populations, increasing waterfowl hunting opportunities.

In the long term there would be both positive and negative effects on fishing. Fishing opportunities would decrease slightly because of the loss of one fishing reservoir ("Wildlife," Chapter 4). Seven reservoirs would be fenced, improving fishing quality.

Cross country recreational access and ORV travel would be reduced by new management fences and mechanical treatments proposed in this alternative. Cattle guards would eliminate some of the fencing impact.

Impacts to prairie dog hunting are the same as Alternative A.

WILDERNESS

The effects on wilderness from this alternative would be the same as discussed in Alternative A.

VISUAL RESOURCES

Mechanical treatments and range developments would be proposed on about 10 percent of public lands located primarily in Class III and Class IV landscapes. Individual projects would meet class guidelines and would be distributed throughout the affected allotments. Surface disturbances which detract from scenic quality would not be anticipated. Fencing selected riparian zones and reservoirs would improve the scenic quality around specific sites. In the long term grazing systems would improve scenic quality through increased vegetation and improved watersheds, primarily in Class IV landscapes.

CONCLUSIONS

Long term big game hunting opportunities would double on affected allotments. There would also be increased waterfowl hunting opportunities. Fishing quality would improve on 7 fenced reservoirs but the total number of fisheries reservoirs would decrease from 27 to 26. Cross country access and ORV travel would be moderately reduced by fences and surface disturbances from mechanical treatments.

Reduction of prairie dog town acreage by 64 percent would significantly reduce shooting opportunities. The effects on the wilderness suitability of the Bittercreek WSA would be insignificant. No significant impacts to visual resources would occur in this alternative.

There would be no irretrievable or irreversible loss of recreation, visual or wilderness resources in this alternative.

CULTURAL IMPACTS SUMMARY — ALTERNATIVE B

Proposed Action	Acres Disturbed	Potential Sites Encountered	Probable Sites Avoided	Remaining Sites Impacted
Mechanical Treatments	175,000	1,750	1,575	175
Water Developments	4,000	40	36	4

Source: BLM, 1980

Cultural Resources

This alternative would affect 179 sites, representing a relatively insignificant consequence because mitigating measures would preserve the physical evidence and information from these sites.

Any cultural sites inadvertently destroyed in this alternative would be irretrievably and irreversibly lost.

Social and Economic Impacts

RANCH ECONOMIC IMPACTS

The short term on overall ranch income in this alternative would be minimal. This is because the only identifiable change in AUMs would be the temporary disruption of grazing as mechanical treatments are applied or grazing systems implemented and the 4-10 year loss of 330 AUMs from the fencing of riparian zones, saline seeps and reservoirs. These losses would represent a significant impact to a few individual operators when their land was out of production.

In the long term 179 operations would show increases while 379 would have no change. These increases are shown by representative size category in Appendix 4.9. The average affected operator would receive about a 35 percent increase in BLM AUMs and about a 9 percent increase in total ranch AUMs. The average change in net annual income for the representative livestock categories ranges from an increase of $430 on small operations (or 15 percent of their current livestock income) to an increase of $4,250 on very large operations (or 7 percent of their current livestock income). Total increases in gross annual livestock sales and net annual income to all affected ranch operations would be approximately $1,910,000 and $296,000, respectively, an increase of 3.4 percent of the current livestock income for all ranches in the study. The potential impact of increases in income due to increases in BLM forage would be the same as discussed in Alternative A except that fewer operations would be affected.

Total permit values in this alternative would increase by $4,635,000 or 15 percent of the present total in the long term. These increases would have a beneficial effect on ranchers' borrowing capacity and the sale value of affected ranches. There would be no short term change. The long term increase in ranch employment would be the full time equivalent to approximately 22 employees, an increase of 13 percent over the current number.

RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

There would be little or no impact on direct and indirect recreation/wildlife related earnings and employment in the short term in this alternative. In the long term recreation/wildlife related direct expenditures for the intensive study area would increase by $81,000 annually, 60 percent more than the present level. These expenditures would generate approximately $22,000 in direct and indirect earnings annually and are estimated to result in the employment of 2 people (Appendix 3.14).

SOCIAL IMPACTS

The overall effect of this alternative on the attitude of the residents toward BLM would be positive because it offers a low level development program with some improvement of the range. The increased vegetation made available for both livestock, and wildlife and watershed would produce favorable attitudes from ranchers, those associated with the ranching industry, recreationists and environmentalists. Some ranchers whose BLM range is currently in good or better condition might resent not having the opportunity to improve their range through AMP development, however. In addition, some recreationists and environmentalists might not feel that enough had been done for wildlife and watershed. This alternative proposes a small number of AMPs (the creation of 70 new and revision of 93 currently in effect) and would result in a minimal increase in governmental presence and control.

The social well-being of approximately 239 ranch families (assuming 1.33 families per operation on the 179 affected operations) would be improved in the long term. Twelve of these operations fall into the small livestock/small cash crop catagory where the positive effects would be greatest.

REGIONAL ECONOMIC IMPACTS

Appendix 4.10 shows the impact on the intensive study area output, earnings and employment of increased livestock sales, range development construction, recreationist expenditures and government employment. Impacts are shown in both the short and long term. In the short term the largest effect on earnings would be from increased construction. The total direct and indirect earnings generated would be $448,000 annually during construction. The largest effect in the long term on earnings would be from increased livestock sales. Increased earnings to the intensive study area from this activity would amount to $817,000 annually while intensive study area gross output resulting from increased livestock sales would be $3,405,000 annually.

Total intensive study area employment would increase by 60 people in the short term and 91 people in the long term. Total intensive study area earnings would increase by $747,000 annually in the short term and $999,000 annually in the long term, a 0.5 percent increase from the current total in the long term.

In the long term assessed valuation for livestock in this alternative would increase by an estimated $1,676,000 in the intensive study area. Property taxes would increase by $27,000 annuallly (or 5 percent above the current level) for these ranches using public lands. There would be no short term change.

CONCLUSIONS

In this alternative income for 179 ranch operations would increase by $296,000 annually (an increase of 3.4 percent over the current livestock income for all ranches in the study) in the long term. Permit values would increase by 15 percent and ranch employment by 13 percent. The social well-being of approximately 239 ranch families (including the families on 12 small livestock/small cash crop operations) would be improved by increased income and permit values. These increases would be moderately significant.

Changes in recreation/wildlife related earnings (+ $22,000) and employment (+ 2 positions) due to increased expenditures for recreation would be insignificant to the total economy of the intensive study area.

The overall impact on the attitudes of ranching oriented residents would be positive because this alternative would increase forage for livestock without a major increase in governmental presence and control. However, some ranchers whose BLM range is currently in good or better condition might resent not having the opportunity to improve their rangeland through AMP development. The impact on the attitudes of recreation/environmental oriented residents would be somewhat less favorable because they might not feel enough was being done for the wildlife and watershed resources.

The short and long term direct and indirect increases of less than 0.5 percent in intensive study area earnings and employment would be insignificant overall. The increase in property taxes would have an insignificant contribution to the total property tax base.

There would be no irretrievable or irreversible loss under this alternative.

ALTERNATIVE C

To enhance livestock forage, this alternative would make the following allocations:

	Short Term AUMs	Long Term AUMs
Livestock	374,064	618,215
Wildlife	20,538	20,538
Non-consumptive	394,602	648,006
Totals	789,204	1,286,759

There would be 419 AUMs (covering 1,062,754 acres) developed and 93 AMPs (558,986 acres) revised in this alternative. Non-AMP allotments would include 121,253 acres of public land in 392 allotments.

No specific grazing treatments would be applied to streamside riparian areas, saline seeps or fishing reservoirs but might be included in other treatments designed to meet the objective of emphasizing livestock use.

There are 138 AMPs that would be developed (335,048 acres) and 20 current AMPs (156,195 acres) that would be revised because the allotments are 50 percent or more in fair or poor condition. This group of allotments would receive periodic spring deferment of grazing. The remaining 281 proposed AMPs and 73 current AMPs (1,130,497 acres) would be considered for application of rest, rotational or deferment grazing treatments. The treatments would be designed to attain 80 percent good ecological range condition. Of the 93 current AMP allotments, all but 7 now have rest or deferment treatments in effect.

Mechanical treatment on 449 allotments (1,333,714 acres) would occur on 920,000 acres. About 650 miles of pasture or allotment boundary fences would be needed to support the grazing treatments as would 50 cattle guards, about 1,000 new water sources and an undetermined number of shade and insecticide devices/oilers. Chemical control of noxious weeds on 2,200 acres would occur and prairie dog control would be exercised on 1,715 acres. The cost of range improvements would be $31,655,800.

Watershed

Grazing treatments proposed in this alternative would promote vegetation growth that provides soil protection. Deferred grazing on allotments in poor and fair ecological range condition until the flowering date of key vegetation species would increase vegetation cover. Grazing treatments on all AMP allotments would promote increased production of vegetation and increase watershed cover (see "Vegetation," Chapters 3 and 4). Soil subgroups 3, 4, 10, 16 and 19 would respond rapidly to grazing management.

Grazing treatments would reduce sediment yield from 1,468 acre-feet/year initially to 1,128 acre-feet/year in the long term. Water yield would decrease from 62,479 acre-feet/year initially to 77,881 acre-feet/year in the long term. Water quality would improve with decreases in runoff and erosion.

Mechanical treatments on soil subgroups 1, 2, 5, 8, 9, 10, 11 and 18 would significantly reduce sediment and water yields from treated areas, being most pronounced on clubmoss-blue grama soils in soil subgroups 1, 2, 9 and 11. Mechanical treatments would reduce sediment yield 2,823 acre-feet/year initially to near zero in the long term on treated areas. Water yield would likewise be reduced from 111,306 acre-feet/year initially to near zero in the long term. Long term sediment and water yields would be assumed to be near

zero since the effectiveness of mechanical treatments vary with soil conditions and the length of the time since the treatment.

Range facilities that aid in livestock distribution would lessen grazing pressure on present concentration areas, particularily floodplain areas and riparian zones. Management fences would increase sediment and water yield due to trailing and trampling of vegetation by livestock, however. Sediment yield would decrease slightly from 0.4 acre-feet/year initially to 0.36 acre-feet/year in the long term. Water yield would decrease in the long term from 14.3 acre-feet/year initially to 14.28 acre-feet/year while water quality would increase slightly due to runoff and erosion increases.

Water development would have the same effects as described in Alternative A.

Consumptive water use by livestock would increase from 4,130 acre-feet/year initially to 6,827 acre-feet/year in the long term based on vegetation allocations to livestock of 374,064 AUMs and a long term allocation of 618,215 AUMs.

Chemical treatment of noxious weeds would reduce livestock grazing pressure on non-infested range. Sediment yield would decrease from 6.8 acre-feet/year initially to 1.5 acre-feet/year in the long term with reduced grazing intensity. Water yield would likewise decrease from 266.2 acre-feet/year initially to 93 acre-feet/year in the long term. Chemical control of prairie dogs on 1,715 acres and revegetation of former prairie dog town sites would also reduce sediment yield.

CONCLUSIONS

This alternative would result in a 68 percent decrease in sediment yield from 4,676 acre-feet/year initially to 1,502 acre-feet/year in the long term (Table 4.5). This would be a highly significant decrease. Water yield would decrease by 51 percent from 188,942 acre-feet/year initially to 92,731 acre-feet/year in the long term, a highly significant decrease also.

Water quality would improve significantly with reduced runoff from mechanically treated sites, areas where range condition is improved by grazing treatments and from chemical treatments of noxious weeds and prairie dogs.

An increase in consumptive use of water by livestock from 4,130 acre-feet/year to 6,827 acre-feet/year in the long term would not be significant compared to the water presently held in stockwater reservoirs.

The 920,000 acres of mechanical treatments proposed in this alternative would reduce sediment and water yields significantly in the long term. In addition the allocation of an equivalent of 648,006 AUMs of vegetation would provide additional residual watershed cover and litter that protect the soil surface from erosion and promote vegetation production. Increased vegetation production on upland areas, new water sources and other range developments would relieve grazing pressure on floodplains and riparian zones, resulting in increased stream channel stability.

There would be no irretrievable or irreversible loss to soil and water resources in this alternative.

TABLE 4.5: SUMMARY OF WATERSHED IMPACTS BY TREATMENTS AND FACILITIES

ALTERNATIVE C

Element	Sediment Yield (ac-ft/yr) Initial	Sediment Yield (ac-ft/yr) Long Term	Water Yield (ac-ft/yr) Initial	Water Yield (ac-ft/yr) Long Term	Water Quality	Consumptive Water Use by Livestock (ac-ft/yr) Initial	Consumptive Water Use by Livestock (ac-ft/yr) Long Term
Grazing Treatments	1,468.1	1,128.00	62,479.1	77,881	+		
Exclosures	-	-	-		0		
Mechanical Land Treatments on 920,000 acres	2,823.3	0	111,305.6	0	+		
Range Facilities	0.4	.36	14.3	14.28	+		
Water Developments	I	I	I	I	0		
Chemical Treatments							
—Noxious Weeds	6.8	1.5	266.2	93.0	+		
—Prairie Dogs	5.3	1.2	207.5	72.5	+		
Non-Treatment	372.1	371.0	14,669.7	14,670	0		
Totals for Existing and Proposed AMPs	4,676.0	1,502	188,942.4	92,731	+	4,130	6,827

I - Insignificant
- - Not applicable in this Alternative

+1 - Increase Water Quality
0 - No change in Water Quality
-1 - Decrease Water Quality

Source: BLM, 1980

Vegetation

Vegetation allocations based on SCS range site and condition guides and on-the-ground inspections and monitoring (as explained in Chapters 1 and 2) would be on the proper use basis. These guides as used (Appendix 2.2) show an overall increase in livestock allocations of 54,999 AUMs although some decreases are indicated (Appendix 2.3). These AUM changes cannot be considered valid without on-the-ground inspections. The guides are based on a 50 percent allocation to consumptive uses and their intended use is in the field with adjustments made for slope, distance from water, introduced species, range within condition classes, etc. The guides (as used) show that there is a greater amount of proper use forage available than currently allocated. Assuming allotment inspections and monitoring would be done prior to and following any changes in livestock use, no vegetative impacts would occur. Any changes in livestock allocations, either increases or decreases, would be within proper use limits and would result in maintenance of plant vigor, production and range condition in the short term (Tables 3.9-3.13). Proper use in combination with improved grazing management and mechanical treatments would ensure plant maintenance and improvement in the long term. About 50 percent of the vegetation would be allocated to wildlife habitat, watershed and other non-consumptive uses. Consumptive use allocations for wildlife would remain at current levels, in both the short and long term, although a significant increase in non-comsumptive forage is expected with the near doubling of livestock forage.

While riparian areas would receive no special consideration, the ecological range condition of floodplains (soil subgroups 6 and 17, 50,920 acres) would improve in response to grazing treatments. Willow and cottonwood would not improve significantly without long term rest treatments but would be maintained at current conditions due to deferred and rest grazing treatments based on observations of current AMPs.

Shoreline and saline seep vegetation surrounding about 2,298 present reservoirs would improve slightly due to rest and deferment treatments and the construction of more water sources. This improvement would be because of lighter use for shorter periods in these livestock concentration areas.

Rest and deferment treatments would continue on AMPs and are proposed for 275 allotments (totaling 796,188 acres). These would periodically exclude livestock use from woody types in pastures. Reduced rubbing damage to woody species by livestock and improved vigor and production of understory species would result.

Periodic deferment until the flowering of key species on allotments which are more than 50 percent fair and poor ecological range condition would allow plant carbohydrate reserves to be restored and would contribute to improved vigor and production of forage plants. Deferment and rest treatments, applied as necessary to accomplish desired objectives on all AMP allotments, would improve ecological condition on responsive soils ("Watershed" and "Vegetation," Chapter 3) and increase plant vigor, litter and infiltration on all soils. Range condition in subgroups 3, 4, 6, 8, 10, 15, 16, 17 and 19 would improve from poor to fair ecological range condition on 6,694 acres, from fair to good on 138,828 acres and subgroups 3, 6, 16 and 17 would improve from good to excellent on 146,396 acres. These improvements would increase vegetation production by 17,500 AUMs. A total of 291,918 acres would improve due to grazing treatments, including those acres of noxious weeds and prairie dog towns that would be improved by grazing treatments following control.

Mechanical treatments of clubmoss-blue grama sites would increase vegetation production by 226,651 AUMs and improve 690,000 acres of poor, fair and good condition range to excellent ecological range condition, and 230,000 acres to good condition. This estimate allows for the failure of some seedings and for livestock concentration areas. If introduced species were seeded, ecological range condition (based on native species) would not be applicable as a measure of condition. (See Appendix 2.2 for an explanation of AUM and condition computations.)

Construction of 1,000 reservoirs would result in loss of 600 AUMs because of flooding and livestock concentrations on shoreline vegetation, based on an average of 3 acres per reservoir and 5 acres per AUM. The additional water sources, management fences, insecticide devices/oilers, shade sources and the proper placement of salt would improve distribution of livestock although this impact has not been quantified.

Leafy spurge would be controlled, improving 2,200 acres presently in fair and poor ecological range condition to good and preventing the probable infestation of an additional 3,080 acres of public lands as discussed in Alternative A. Other scattered infestations of leafy spurge and other noxious weeds would also be controlled but these are unquantifiable.

Prairie dogs would be eradicated and the current towns rehabilitated by mechanical treatments and grazing treatments, causing an improvement of 1,715 acres to good and excellent ecological range condition from fair and poor. This figure is included in the total for treatments. Vegetation production would increase about 485 livestock AUMs.

CONCLUSIONS

This alternative would increase vegetation production by 299,150 AUMs. A short term increase of 54,999 AUMs plus a long term increase of 244,151 AUMs would amount to a 94 percent increase in livestock forage, a highly significant increase. Wildlife forage would also increase significantly but cannot be quantified.

Grazing would be at moderate use levels and increases to plant maintenance would be proportional to livestock forage increases. Noxious weeds would be controlled and prairie dogs would be eradicated. Riparian zones would not receive special emphasis but would be maintained in current conditions due to rest and deferment grazing treatments. Overflow range sites in soil subgroups 6 and 17 would improve in range condition because of their high responsiveness to grazing management. The loss of 600 AUMs because of reservoir construction and use would be insignificant. A total of 1,211,918 acres would improve in condition while 537,320 acres would not change.

The long term forage allocation to livestock would increase from the present 319,065 to 615,215 AUMs. Wildlife allocations would remain at 20,538 AUMs. Wildlife forage would increase significantly but would not be allocated due to the resource objectives of this alternative. The forage allocation to non-consumptive uses would increase from the present 339,603 to 657,779 AUMs, a highly significant increase in vegetation for watershed protection and wildlife habitat.

The ecological range improvement would be highly significant, primarily due to mechanical treatments as is shown below.

There would be no irretrievable or irreversible loss of vegetation resources in this alternative.

IMPROVEMENTS IN ECOLOGICAL RANGE CONDITION — ALTERNATIVE C

	Excellent Acres	Good Acres	Fair Acres	Poor Acres	Unclassified Acres
Present	14,832	1,035,208	623,022	6,803	69,373
Long Term	851,228	657,640	170,888	109	69,373

Livestock

In this alternative livestock forage allocations would increase by 55,049 AUMs in the short term, the equivalent of 3,849,930 pounds of red meat (live weight) production (Appendix 4.4). In the long term allocations would increase by a total of 299,150 AUMs, 94 percent over current levels. This is equal to 49,888 additional adult cattle grazing for six months or 20,940,465 pounds of red meat production.

Continuation of the present seasons of use in the short term and lengthening of this period to use additional forage in the long term would be very beneficial to red meat production. In the long term stretching the grazing season would reduce the winter feeding period during mild winters. If the grazing season were lengthened from the present average of 6 months to a full 8 months, there would be forage for 77,277 cattle. This is a 45 percent increase in livestock numbers from a 33 percent increase in the grazing period.

Range improvement brought about by grazing treatments would result in 1,224,982 pounds more in red meat (live weight) production. Breeding success would be improved on large allotments which would be sub-divided into pastures, especially on allotments of 5,000 acres or more. This would affect 50 allotments totaling 530,090 acres.

Increased forage production due to mechanical treatments of clubmoss-blue grama soils would increase livestock production by 15,865,553 pounds and improve the nutrition and palatability of forage. Possible detrimental effects on livestock by these treatments are the same as discussed in "General Impacts."

Water developments, shade sources, insecticide devices/oilers and the proper placement of salt would improve livestock distribution and reduce stress. This would contribute to improved weaning weights and better condition of brood cows at the end of the grazing season.

Forage increases from prairie dog control and mechanical rehabilitation (in combination with proper use and grazing treatments) would result in 33,968 more pounds of livestock production. Leafy spurge control, proper use grazing and grazing treatments would increase productivity and grazing availability of 23,100 pounds. Increased livestock production because of prairie dog and noxious weed control are included in the totals given for grazing treatments and mechanical treatment as the control alone would not cause the projected increase without the other practices.

CONCLUSIONS

In this alternative livestock production would increase in both the short and long term; 3,849,930 additional pounds of red meat (live weight) would be produced in the short term and 20,940,465 additional pounds in the long term. This is an increase of 94 percent, which would be highly significant.

Grazing treatments could cause increased livestock stress, which would be offset by forage increases from mechanical and grazing treatments. These treatments would increase overall red meat production. Livestock stress caused by trailing long distances to water, shade and rubbing sources would be reduced or eliminated by new water sources, artificial shade sources and insecticide devices/oilers.

Increases in forage could be used by greater numbers of livestock and/or an increase in the grazing season; for example, livestock numbers could be increased by 45 percent and the grazing season lengthened by 33 percent. This would be 77,277 cattle grazing for 8 months (current use is equivalent to 53,178 cattle for 6 months). If numbers alone were increased, 49,858 additional cattle would be grazed for 6 months.

There would be no irretrievable or irreversible loss of livestock resources in this alternative.

Wildlife

BIG GAME (DEER, ANTELOPE, ELK)

Deer and antelope populations are projected to increase by 50 percent in the long term due to the proposed grazing treatments and range developments (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication; Appendix 4.5). Although no additional vegetation would be allocated to wildlife in this alternative, plant species not used by livestock would be available to help satisfy the forage needs of the additional 4,000 deer and 2,375 antelope.

Grazing treatments with spring rest or deferment would improve the quality of big game forage. Any present conflicts between livestock and big game in the late fall-winter, however, could increase because of a possible 1-2 month extended grazing season. Late fall-winter use by livestock usually results in cattle foraging on shrubs. If the livestock use is on a deer or antelope winter range, conflicts for winter forage would result. Additional forage (especially forbs) would be available to big game on mechanically treated areas.

It is projected that 5 miles (3 percent) of high value streamside riparian vegetation would improve to satisfactory condition as a result of grazing treatments with rest and proper placement of range facilities and land treatments (Jeffery Dose, 1980, BLM, Personal Communication). High value streamside vegetation in satisfactory condition would increase from 58 to 63 miles (1,406 to 1,527 acres). Thus 63 miles (34 percent) of high value riparian vegetation would be in satisfactory condition, an increase of 9 percent. However, 123 miles (2,982 acres or 66 percent) of high value riparian vegetation would remain in unsatisfactory condition.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE, RING-NECKED PHEASANT)

In the long term additional residual vegetation from rest or deferred grazing and mechanical treatments is the same as discussed in Alternative A. Additional food and cover would be available to these birds (especially sharp-tailed and sage grouse) on the high value streamside riparian vegetation which would improve to satisfactory condition.

WATERFOWL

Rest or deferment would produce the same number of ducks as discussed in Alternative A. Additional cover would be available to waterfowl (especially puddle ducks) on all or part of the mechanical treatments that are done within 0.5 miles of potholes and reservoirs. Additional food and cover would be available to waterfowl on the high value streamside riparian vegetation which improved to satisfactory condition. New water sources proposed in this alternative would produce the same number of ducks and geese as discussed in Alternative A.

NONGAME

Grazing treatments with rest or deferment would provide the same nongame cover as discussed in Alternative A. Additional cover and forage would be available to nongame on the mechanically treated acres. The range management fences would provide additional perching sites for many nongame birds. Shore birds would increase with the improvement of present and future shorelines as described in Alternative A.

The proposal to totally eliminate the present 18 prairie dog towns, covering 1,715 acres in this Alternative, would possibly eliminate the open nesting habitat of the mountain plover and severely reduce the burrows of the burrowing owls and other species associated with prairie dog towns. Potential habitat for the black-footed ferret would also be eliminated.

FISHERIES

It is estimated that 15 of the 27 fisheries reservoirs would be lost as viable fisheries because of accelerated sedimentation due to lack of rest from livestock grazing (Jeffery Dose, 1980, BLM, Personal Communication; BLM Inventory File 6670). Approximately 20 new fisheries would be created in this alternative, increasing the number of viable fisheries reservoirs from 27 to 32 (19 percent) in the long term.

CONCLUSIONS

A significant increase in deer and antelope is projected from the 50 percent big game population increase on 512 AMP allotments, resulting in an additional 4,000 deer and 2,375 antelope.

Rest and deferment on the AMP allotments totaling 1,621,740 acres and 920,000 acres of mechanical treatments in this alternative would cause a significant increase in residual vegetation, leading to increase in upland game birds and nongame wildlife. A significant annual increase of 39,800 (114 percent) in duck production would occur from rest and deferment treatments on present and new water sources. The 840 proposed goose nesting islands would allow a significant increase of 2,350 Canada geese (43 percent).

There would be a moderately significant increase in fisheries reservoirs from 27 to 32 (19 percent). High value streamside riparian vegetation in satisfactory condition would significantly increase from 58 to 63 miles or 9 percent.

Wildlife would not receive a greater forage allocation in the long term which would be moderately significant. The elimination of 1,715 acres of prairie dog towns would also have a moderately significant impact on wildlife. The number of wildlife lost after 920,000 acres of clubmoss-blue grama were treated would be insignificant. Riparian zones would only benefit from grazing treatments where they are included in a pasture undergoing treatments; they would not, however, receive rest from exclosure fences as livestock access would be unrestricted.

There would be an irretrievable loss of prairie dogs on controlled prairie dog towns in this alternative but this would not be an irreversible loss.

Recreation, Wilderness, Visual Resources

RECREATION

The increases in big game (50 percent), ducks (114 percent) and geese (43 percent) would not lead to a substantial improvement in hunting quality because of the increased conflicts between livestock and hunters. The potential for doubling livestock numbers and/or lenghtening grazing seasons into the fall hunting season would reduce shooting opportunities in prime hunting areas around streams and reservoirs where livestock concentrate.

In the long term fishing opportunities would increase by 19 percent because of the construction of new reservoirs ("Wildlife," Chapter 4). As no reservoirs would be fenced with this alternative, however, livestock would be present throughout the summer and fall fishing season and would reduce overall fishing quality.

New fences would create the same cross country access problems described in Alternative A. Surface disturbances from mechanical treatments would reduce ORV travel opportunities.

The proposal to eradicate prairie dog towns would eliminate the popular recreational sport shooting of prairie dogs.

WILDERNESS

Because of the constraints of the Wilderness IMP, new range projects or mechanical treatments must be non-impairing to wilderness before they would be allowed. No significant impacts to wilderness suitability would occur.

VISUAL RESOURCES

Mechanical treatments and range developments are proposed on approximately 53 percent of public lands, primarily in VRM Class III and Class IV landscapes. Individual projects would meet class guidelines. The cumulative effect of 920,000 acres of mechanical treatment, however, would detract from the scenic quality and could lower Class III areas to Class IV. Grazing treatments would have the long term potential to improve scenic quality through increased vegetation and improved watersheds, especially in Class IV landscapes.

CONCLUSIONS

Increases in hunting and fishing opportunities would be overshadowed by the reduced recreational access and increased conflicts with livestock and livestock associated range developments. Cross country access would be significantly restricted by additional fencing and the surface disturbances from mechanical treatments.

Eradication of prairie dogs would permanently eliminate a popular recreation activity. Impacts to wilderness suitability would be insignificant.

The cumulative effect of mechanical treatments would detract from the scenic quality and could lower Class III areas to Class IV. Grazing systems would have the long term potential to improve scenic quality in Class IV landscapes.

There would be an irretrievable loss of prairie dog shooting opportunities in this alternative but this would not be irreversible.

Cultural Resources

This alternative would affect 924 sites, representing the greatest impact of all of the six alternatives. This would still be a relatively insignificant consequence since mitigating measures would preserve the physical evidence and information from these sites.

Any cultural site inadvertently destroyed in this alternative would be irretrievably and irreversibly lost.

CULTURAL IMPACTS SUMMARY — ALTERNATIVE C

Proposed Action	Acres Disturbed	Potential Sites Encountered	Probable Sites Avoided	Remaining Sites Impacted
Mechanical Treatments	920,000	9,200	8,280	920
Water Developments	4,000	40	36	4

Source: BLM, 1980

Social and Economic Impacts

RANCH ECONOMIC IMPACTS

There would be both short and long term increases and decreases in individual net ranch incomes in this alternative. Positive and negative changes on 162 operations with only non-AMP allotments are not considered in the ranch income portion because these are "paper" changes as opposed to real forage changes. With these non-AMP allotments, authorized paper use would change; but the actual amount of grazing would stay the same. Cash flow would not be affected since there would be no change in the ranch operation.

Appendices 4.11 and 4.12 display short term impacts to operations with AMP allotments by representative size category. In addition, there would be an additional temporary loss in grazing as mechanical treatments are applied or grazing systems implemented. These losses could represent a significant impact to a few individual operators when their land is out of production. Two hundred and ninety-three operations would show an increase, ninety-five a decrease and eight would have no change. The average operation showing positive impacts would receive about a 35 percent increase in BLM AUMs and about a 10 percent increase in total ranch AUMs. The average change in net annual income for the representative livestock categories ranges from an increase of $350 on small operations (or 12 percent of their current livestock income) to an increase of $3,900 on very large operations (or 6 percent of their current livestock income). For those operators that would receive decreases, the average decrease is 25 percent in BLM AUMs or about a 6 percent in total ranch AUMs. The average decrease in net annual income for the representative livestock categories ranges from $550 on small operations (or 20 percent of their current livestock income) to $7,200 on very large operations (or 11 percent of their current livestock income). Of the operations with decreases, 19 would sustain more than a 10 percent loss in total ranch and farm income. Total short term increases in annual income to all affected ranch operations would be $400,000 and total decreases $142,000. This is a net increase of $258,000, 3 percent of the current livestock income for all ranches in the study. This figure is based on a net increase in gross annual livestock sales of $2,077,000.

Appendices 4.13 and 4.14 display impacts in the long term to operations with AMP allotments by representative size category. Three hundred and seventy-nine operations show an increase and seventeen a decrease in the long term. For those operations that would receive an increase, the average increase is more than 100 percent in BLM AUMs and about 35 percent in total ranch AUMs. The average increase in net annual income for the representative livestock categories ranges from $1,100 on small operations (or 39 percent of their current livestock income) to $16,400 on very large operations (or 25 percent of their current livestock income). For those operations that would receive decreases, the average decrease is 30 percent in BLM AUMs and 7 percent in total ranch AUMs. Most of these operations fall into the medium livestock category and these operations would sustain an average decrease in net annual income of $1,750 (or 15 percent of their current livestock total). Eight of these operations would sustain losses of more than 10 percent of their total ranch and farm income. Total increases in annual income to all affected ranch operations would be $1,974,000 and total decreases $38,000. This is a net increase of $1,936,000, 23 percent of the current livestock income for all ranches in the study. This figure is based on a net increase in gross annual livestock sales of $12,626,000.

Total permit values would increase by $5,267,000 (net) in the short term and $30,831,000 (net) in the long term. The long term figure is a 99 percent increase over the present total. These figures include the paper changes on 162 non-AMP allotments. Increases in permit value would have a beneficial effect on ranchers' borrowing capacity and the sale value of affected ranches while decreases would have the opposite effect.

The increase in ranch employment would be the full time equivalent of about 22 employees in the short term and 127 in the long term. The long term figure represents a 73 percent increase over the current number.

RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

There would be little or no impact on direct and indirect recreation/wildlife related earnings and employment in the short term in this alternative. In the long term recreation/wildlife related direct expenditures for the intensive study area would increase by $71,000 annually or 53 percent more than the present level. These expenditures would generate approximately $19,000 in direct and indirect earnings annually and are estimated to result in the employment of 2 people (Appendix 3.14).

SOCIAL IMPACTS

This alternative would have a positive effect on the attitude toward BLM by ranchers and that part of the community that identifies closely with them. Sizeable increases in vegetation would be made available for livestock and the economic benefits would be substantial. The small number of ranchers that would sustain short and long term decreases in grazing, however, would be expected to have negative attitudes toward this alternative. Although there would be some increase in vegetation for wildlife and watershed, the attitudes of recreationists and environmentalists would be less favorable because they would feel these resources were being short-changed. Conflicts between recreation and livestock would increase also.

This alternative proposes a large number of AMPs (the creation of 419 new and revision of 93 currently in effect) and would mean greater governmental presence and control. It is assumed, however, that since the AMP programs would be developed specifically to benefit livestock, the affected operator's attitude would be positive.

The social well-being of approximately 391 ranch families (assuming 1.33 families per operation on the 293 affected operations) would be improved in this alternative and the social well-being of about 127 ranch families (on 95 operations) would be decreased in the short term. Twenty-two of the operations with increases and eight of the operations with decreases fall into the small livestock/small cash crop category where the potential for being affected is the greatest. In the long term the social well-being of approximately 505 ranch families (on 379 operations) would be improved and the well-being of approximately 23 ranch familes (on 17 operations) would have the potential for a decrease. Thirty-one of the operations with increases (and none of the decreases) fall into the small livestock/small cash crop category.

REGIONAL ECONOMIC IMPACTS

Appendix 4.15 shows the impact on the intensive study area output, earnings and employment of increased livestock sales, range development construction, recreational expenditures and government employment. Impacts are shown in both the short and long term. In the short term the largest effect on earnings would be from increased construction. The total direct and indirect earnings generated would be $1,616,000 annually during construction. The largest effect in the long term would be from increased livestock sales. Increased earnings to the intensive study area from this activity would amount to $6,466,000 annually and intensive study area gross output resulting from increased livestock sales would be $26,942,000 annually.

Total intensive study area employment would increase by 317 people in the short term and 654 people in the long term. Total earnings would increase by $3,696,000 annually in the short term and $6,886,000 annually in the long term or 3.4 percent of the current total.

Valuation for livestock in the intensive study area would increase by an estimated $2,170,000 in the short term and $13,198,000 in the long term. In the long term property taxes for livestock would increase by $211,000 or 38 percent above the current level for those rances using public lands.

CONCLUSIONS

In the short term income would increase by $400,000 annually on 293 operations and decrease by $142,000 annually on 95 operations. The net change in ranch income would be an increase of $258,000 annually (or 3.0 percent of the current livestock income for all ranches in the study). Permit values would show a net increase of 17 percent and ranch employment an increase of 13 percent. Social well-being would be improved for 391 ranch families, including those on 22 small livestock/small cash crop operations. These short term increases would be moderately significant. Social well-being would be decreased for 127 ranch families on 95 operations; 8 of these are small livestock/small cash crop operations and 16 other operations would lose more than 10 percent of their total ranch/farm income. These short term decreases would be moderately significant.

In the long term income would increase by $1,974,000 annually on 379 operations and decrease by $38,000 annually on 17 operations in this alternative. The net change in ranch income would be an increase of $1,936,000 annually (or 23 percent of the current livestock income for all ranches in the study). Permit values would show a net increase of 99 percent and ranch employment an increase of 73 percent. Social well-being would be improved for 505 ranch families, including those on 31 small livestock/small cash crop operations. These long term increases are considered to be highly significant because of the large increases in income. Social well-being would be decreased for 23 ranch families; none of these operations fall into the small livestock/small cash crop category but 8 would sustain a loss of more than 10 percent of their ranch/farm income. These long term decreases would be moderately significant.

Changes in recreation/wildlife related earnings (+ $19,000) and employment (+ 2 positions) due to increased expenditures for recreation would be insignificant to the total economy of the intensive study area.

The overall impact on the attitudes of ranching oriented residents would be positive because the alternative would provide substantial increases in forage for livestock but there would also be a major increase in government presence and control. The impact on the attitudes of recreation/environmental oriented residents would be less favorable because they would feel the wildlife and watershed resources were being shortchanged.

The increases in intensive study area earnings (1.8 percent in the short term and 3.4 percent in the long term) and employment (1.6 percent in the short term, 3.3 percent in the long term) would be moderately significant. The long term increase in property taxes (38 percent) would also be moderately significant.

There would be an irretrievable loss of ranch income in this alternative. A few ranches might be unable to stay in business in their present form. There would be no irreversible loss.

ALTERNATIVE D

Proposed initial and long term vegetation allocations under this alternative would be:

	Initial AUMs	Long Term AUMs
Livestock	223,933	274,983
Wildlife	20,538	61,614
Non-consumptive	434,735	491,281
Totals	679,206	827,878

The area's 93 AMPs (covering 558,986 acres) could be revised to meet this alternative's objectives of enhancing watershed values, wildlife habitat and, to a limited degree, recreational resources. An additional 419 AMPs (covering 1,062,754 acres) would be developed, incorporating grazing treatments and land and grazing treatments to meet the same objectives. An additional 392 allotments (121,253 acres) would remain without AMPs. The number of AMP and non-AMP allotments would be the same as for alternatives A and C but grazing treatments and individual AMP objectives would reflect the change in management emphasis.

The initial allocation to livestock would be 30 percent less than the current permitted use of 319,065 AUMs. The reduction in livestock AUMs would result from grazing deferment until July 1 on 488 allotments (1,612,553 acres) as well as from the resting of riparian vegetation. Construction of 740 miles of fences would result in 4-10 years rest for 4,509 acres of high value streamside riparian vegetation, 1,933 one acre seeps and vegetation on 169 acres around 27 fishing reservoirs.

This alternative would include 225,000 acres of mechanical treatments discussed for Alternative A also. Water developments and noxious weed control would also be the same as outlined for Alternative A. Other range developments and actions would be: (1) about 400 miles of pasture or allotment boundary fences; (2) 50 cattle guards; (3) prairie dog control to maintain, but not exceed, the current 1,715 acres affected; and (4) an undetermined number shade sources and insecticide devices/oilers. The estimated cost of range improvements is $17,774,900 and is based upon current costs per improvement.

Watershed

Development and revision of AMPs would improve watershed condition by establishing proper use stocking rates, and rest and deferment grazing treatments and improving livestock distribution.

Deferment of grazing until July 1 would provide rest each year for the 419 proposed and 93 current AMPs (see "Vegetation," Chapters 3 and 4). No grazing would occur when soils were saturated with moisture (spring rain or melting snow), reducing soil compaction and lowering the sediment load of runoff water. Light grazing use would reduce the adverse effects of grazing and improve watershed condition by increasing vegetation cover and litter through meeting the phenological requirements of plants.

Fifty percent of all forage vegetation production would be allocated to non-consumptive users, increasing from an equivalent of 434,735 AUMs initially to the equivalent of 491,281 AUMs in the long term. Grazing treatments would result in lowering both sediment and water yields (Table 4. 6). Sediment yield would decrease from 3,600 acre-feet/year initially to 1,606 acre-feet/year in the long term while water yield would decrease from 146,563 acre-feet/year initially to 80,629 acre-feet/year in the long term.

Livestock exclosure fencing of riparian zones around reservoirs and saline seeps along streams would reduce sediment and water yields. Protection of streamside riparian vegetation would reduce erosion of streambanks and channels and prevent streambank sloughing associated with livestock trailing. Reservoir fencing would provide a 100 foot wide buffer zone that would desilt overland flow before the water enters reservoirs. Fenced shorelines and dams would revegetate with the exclusion of livestock trampling and trailing. Fencing saline seeps would allow establishment of deep-rooted wetland type vegetation to use seep water and preclude water evaporation and accumulation of salts. Exclosure fencing would reduce sediment yield from 20.3 acre-feet/year initially to 1.03 acre-feet/year in the long term while water yield would be reduced from 799 acre-feet/year initially to 248 acre-feet/year in the long term. Water quality would improve significantly with reductions in suspended sediment, turbidity and salt content due to exclosure fencing.

TABLE 4. 6 : SUMMARY OF WATERSHED IMPACTS BY TREATMENTS AND FACILITIES

ALTERNATIVE D

Element	Sediment Yield (ac-ft/yr) Initial	Sediment Yield (ac-ft/yr) Long Term	Water Yield (ac-ft/yr) Initial	Water Yield (ac-ft/yr) Long Term	Water Quality	Consumptive Water Use by Livestock (ac-ft/yr) Initial	Consumptive Water Use by Livestock (ac-ft/yr) Long Term
Grazing Treatments	3,600.9	1,606.00	146,563.3	80,629	+		
Exclosures	20.3	1.03	799.3	248	+		
Mechanical Land Treatments	690.5	0	27,221.5	0	+		
Range Facilities	0.6	.63	25.0	25	0		
Water Developments	I	I	I	I	0		
Chemical Treatments							
—Noxious Weeds	6.8	1.51	266.2	93	+		
—Prairie Dogs	0	-	0	-	0		
Non-Treatment	372.1	371	14,699.7	14,670	0		
Totals for Existing and Proposed AMPs	4,691.2	1,980	189,545.5	95,665	+	2,583	3,037

I - Insignificant
- - Not applicable in this Alternative

+1 - Increase Water Quality
0 - No change in Water Quality
-1 - Decrease Water Quality

Source: BLM, 1980

Mechanical treatments would result in lowered sediment and water yields. Sediment yield would decrease from 690 acre-feet/year to zero in the long term. Water yield would likewise decrease from 27,221 acre-feet/year initially to zero in the long term. Long term yields are assumed to be zero through the end of the 22 year period because the efficiency of the treatments depend on soil conditions and the time since the treatments. Some treatments, such as contour furrowing and scalping, are more efficient and longer lasting than chiseling or pitting. The acreage of each treatment type has not been determined, so all treatments are assumed to have a life expectancy of 22 years.

Livestock trailing along management fences would result in soil and vegetation disturbance on 134 acres. Sediment yield would increase slightly from 0.6 acre-feet/year initially to .63 acre-feet/year in the long term. Water yield would not increase in the long term from 25 acre-feet/year but water quality would decrease slightly due to increased erosion.

This alternative proposes an initial equivalent vegetation allocation to livestock of 223,933 AUMs and a long term equivalent allocation of 274,983 AUMs.

Development of water sources would have the same effects as discussed in Alternative A. Consumptive use of water by livestock would increase from 2,583 acre-feet/year initially to 3,037 acre-feet/year based on these AUMs. This increase is insignificant. However, 454 acre-feet of water per year would not be available to downstream users.

Chemical treatment of noxious weeds would have some effects as discussed in Alternative A.

CONCLUSIONS

This alternative would result in a 58 percent decrease in sediment yield from 4,691 acre-feet/year to 1,980 acre-feet/year in the long term (Table 4.15). Water yield would decrease 50 percent, from 189,545 acre-feet/year initially to 95,665 acre-feet/year. These reduced yields would be significant.

Water quality would improve significantly with reductions in suspended sediment in surface waters. Water consumption by livestock would increase by 15 percent from 2,583 acre-feet/year to 3,037 acre-feet/year in the long term but would be insignificant in comparison to the water presently contained in stockwater reservoirs.

Improvements in watershed condition would be due mainly to the deferment of grazing for 2 months in the spring and mechanical treatments of clubmoss-blue grama soils. Spring deferment would allow plants time for phenological development that improves plant production and consequently watershed cover. The 56,546 increase in equivalent AUMs would help protect watersheds from erosion and maintain water quality by reducing runoff.

There would be no irretrievable or irreversible loss to soil and water resources in this alternative.

Vegetation

This alternative would allocate vegetation to consumptive users at a light use level in both the short and long term. In the short term elimination of spring grazing (4/1-6/30) and the fencing of selected riparian zones and reservoirs would reduce livestock allocations by 95,132 AUMs or 30 percent from the current levels. Elimination of spring grazing and light use would improve plant vigor, cover and ecological range condition.

Rest from livestock grazing by fencing high value riparian zones for 4-10 years followed by rotation grazing would improve riparian vegetation to meet resource objectives (Appendix 1.2). Spring deferment, light use and rest and deferment treatments would improve vigor, production and composition of desirable grasses on floodplains and riparian zones in soil subgroups 6 and 17 (50,920 acres). The response of willow and cottonwood to light grazing and grazing treatments cannot be quantified but a gradual increase in these species on suitable sites would be probable.

Exclosing fishing reservoirs and 1,933 saline seeps would increase production of riparian and shoreline vegetation, especially deep-rooted species such as willow , cottonwood and salt-tolerant introduced species such as tall wheatgrass. Periodic grazing treatments (after 4-10 years) in saline seeps would maintain plant vigor. Vigorous plants would use the extra moisture, controlling saline seeps and preventing the loss of desirable plants which are not salt-tolerant. Shoreline vegetation on the remaining 2,271 reservoirs and pits would be improved by light use, grazing treatments and additional water sources which would reduce the duration and degree of grazing use in these livestock concentration areas.

Rest and deferment treatments would continue on present AMP allotments and are proposed for 275 allotments. These treatments would periodically exclude livestock use from woody types in pastures. These woody areas would benefit from grazing treatments in addition to spring deferment and light use by reduction of livestock rubbing and increases in the vigor and cover of understory plants.

While physiological requirements of most plants would be met by spring deferment and light grazing, grazing systems would rest and defer livestock concentration areas (particularly floodplains and riparian zones) which receive moderate to heavy use while less accessible areas are left virtually ungrazed (Hormay, 1970). Allotments dominated by soil subgroups 3, 4, 6, 8, 10, 15, 16, 17 and 19 would benefit the most from grazing systems: 146,396 acres would improve from good to excellent ecological range condition, 138,828 acres would improve from fair to good and 6,694 acres would improve from poor to fair. A total of 291,918 acres would improve in ecological range condition due to grazing systems,increasing vegetation production (in terms of livestock forage) by 17,500 AUMs. Only 11,550 AUMs (66 percent of the total) would be allocated to livestock, however; the remainder would be available for wildlife habitat, watershed cover and recreational uses.

If sufficient desirable native species were available prior to mechanical treatments or interseeded with scalping or furrowing treatments, excellent range condition would be attained on at least 75 percent (168,750 acres) of the 225,000 acres proposed for treatments. The remaining 56,250 acres would improve to good ecological range condition. Forage production would increase an equivalent of 59,848 livestock AUMs at moderate use but only 66 percent of this total (39,500 AUMs) would be allocated to livestock. Light use would allow 65-70 percent of the forage to remain as wildlife forage, habitat and watershed cover. (See Appendix 2.2 for descriptions of AUM and range condition computations.)

Reservoir construction and concentrated use by livestock would take 3,000 acres out of production and result in a loss of 600 AUMs of forage.

Livestock trailing along management and exclosure fences would reduce vegetation production slightly. Water developments, shade sources, insecticide devices/oilers and the proper placement of salt would reduce the overuse of floodplains and other concentration areas by improving livestock distribution.

Leafy spurge and other noxious weeds would be controlled, resulting in improvement of 2,200 acres and the prevention of a probable infestation of 3,080 acres of public lands. Prairie dogs would be controlled at present levels, leaving about 1,715 acres of prairie dog towns that would remain in poor ecological range condition. Control efforts, light grazing and improved grazing management would prevent the potential invasion of 239,000 additional acres.

CONCLUSIONS

Deferment of spring use, light grazing, rest and deferment treatments, mechanical treatments and noxious weed control would improve the ecological condition of 516,918 acres. Plant vigor, litter cover and water infiltration would improve on all 512 allotments (1,621,741 acres) proposed for AMPs as a result of light use, spring deferment and grazing treatments.

Rest treatments of 4-10 years would improve 6,611 acres in riparian, reservoir and saline seep exclosures to reach resource objectives. Spring deferment, light use, rest and deferment would improve floodplains and riparian zones not classified as high value but the improvement in streambank condition (Appendix 3.9) cannot be quantified. The ecological range condition of floodplains (subgroups 6 and 17) would improve to good and excellent.

The long term livestock allocation would be 274,983 AUMs or 14 percent below the present 319,065 AUMs, a significant decrease; wildlife AUMs would increase from 20,538 to 61,614, or 300 percent, a highly significant increase. The allocation to non-consumptive uses would increase significantly from 434,735 AUMs to 491,281 AUMs. The loss of 600 AUMs due to reservoir construction and use would be insignificant.

Ecological range condition would improve significantly as is shown below.

There would be no irretrievable or irreversible loss of vegetation resources in this alternative.

IMPROVEMENTS IN ECOLOGICAL RANGE CONDITION — ALTERNATIVE D

	Excellent Acres	Good Acres	Fair Acres	Poor Acres	Unclassified Acres
Present	14,832	1,035,208	623,022	6,803	69,373
Long Term	329,978	1,083,890	265,888	109	69,373

Livestock

This alternative would reduce current livestock AUMs by 30 percent, mainly because of the elimination of grazing from 4/1-6/30. The 95,132 AUMs lost would be the equivalent of 47,566 cattle grazing for the 2 month period. Five small allotments (totaling 2,323 acres) would be excluded from grazing entirely since all current grazing is during the excluded period. The overall loss in production of live beef would be 6,659,258 pounds in the short term, 3,085,740 pounds in the long term (Appendix 4.4). Livestock numbers would remain nearly constant in the short term and would increase by about 12,763 head in the long term since increased forage in this alternative could only be utilized by increasing livestock numbers.

The 223,933 AUMs allocated in the short term and the 274,983 AUMs allocated in the long term would allow grazing at light use levels; that is about 30-35 percent of the available forage would be used by livestock. This level of use would be beneficial to livestock production on a per-animal basis, leading to higher weaning weights, calf crops and cow weights at the end of the grazing season (Houston and Woodward, 1966). Any change from the current livestock production levels would be dependent on the present degree of use in a particular allotment. Changes could vary from none to significant improvements in per-animal production.

Livestock production would also be affected by loss of the use of some plants that are only available or palatable in the spring. Sandberg bluegrass, prairie junegrass and many forbs complete their life cycles during the period when grazing would not be allowed, becoming dry and unpalatable during the time grazing would be allowed. Needleandthread, another important livestock forage plant in the spring in the EIS area, develops sharp awns in the summer which would reduce its palatability. Although forage supplies would be abundant at the beginning of the grazing season, livestock would not fully benefit since the greatest livestock gains take place when forage is green and growing (Hormay, 1970; Smoliak, 1960).

Grazing treatments with fewer pasture moves (due to the shorter season) combined with light use would maintain or improve per-animal productivity and would increase live beef production by 808,500 pounds in the long term as compared to the short term. Breeding success would be improved on 50 allotments totaling 530,090 acres. Mechanical treatments on 225,000 acres in 266 allotments would increase forage supplies equal to 2,765,018 pounds of red meat production (live weight) and improve palatability and nutrition of forage. Long term increases due to grazing and mechanical treatments would not offset the reduction caused by the elimination of spring grazing, a net reduction of 3,085,740 pounds resulting.

Water developments, shade sources, insecticide devices/oilers, management fences and the proper placement of salt would improve livestock distribution, reducing stress caused by trailing to water and shade. Riparian exclosures on 186 miles of streamside riparian zones would limit the access of livestock to water and shade and cause increased stress in some cases. The net result on the 111 allotments where riparian exclosures are proposed could be either positive or negative to livestock production, depending on the present situation in that allotment.

CONCLUSIONS

This alternative would result in a loss of 6,659,258 pounds in red meat (live weight) production in the short term and a 3,085,740 pounds reduction in the long term. These reductions would be offset somewhat by an unquantifiable improvement in per-animal production which would result from light grazing use, fewer pasture moves, mechanical treatments and range facilities. Livestock numbers would not change substantially in the short term and would increase by approximately 12,763 head or 24 percent in the long term.

There would be an irretrievable reduction in permitted AUMs in this alternative but this would not be irreversible.

Wildlife

BIG GAME (DEER, ANTELOPE, ELK)

A 200 percent increase in deer and antelope populations is projected in the long term due to the proposed grazing treatments and range developments in this alternative (Richard Trueblood, 1980 Montana Department of Fish, Wildlife and Parks, Personal Communication; Appendix 4.5). An increase of 41,076 AUMs (300 percent from 20,538 to 61,614) would help satisfy the forage needs of the additional 16,000 deer and 9,500 antelope.

Deferment until July 1 on 512 AMP allotments would provide adequate spring and summer forage for big game populations in the long term. Grazing treatments would be simpler on all AMP allotments but would contain additional rest or deferment, relieving conflicts between livestock and big game for winter forage. Additional forage (especially forbs) would be available to big game on the mechanically treated areas.

Rest by fencing the entire 186 miles (4,509 acres) of high value riparian vegetation and the 1,933 one-acre saline seeps below reservoirs would provide additional forage and cover for big game. High value streamside riparian vegetation in satisfactory condition would increase from 58 to 186 miles (1,406 to 4,509 acres). Thus 186 miles (100 percent) of high value riparian vegetation would be in satisfactory condition, an increase of 221 percent.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE, RING-NECKED PHEASANT)

Spring-early summer (until July 1) deferment on carry-over residual vegetation would provide adequate residual forage for nesting and brood rearing for upland game birds on the AMP allotments. Grazing treatments would contain additional rest or deferment, providing residual winter food and cover. Additional food and cover would also be available to upland game birds (especially sharp-tailed and sage grouse) on the mechanically treated areas. Rest by fencing all high value streamside riparian vegetation and 1,933 saline seeps below reservoirs would provide additional food and cover for sharp-tailed grouse and ring-necked pheasants.

WATERFOWL

Deferment until July 1 on 512 AMP allotments and grazing treatments which contain additional rest or deferment would provide residual nesting cover for waterfowl. This cover would have the potential of producing 134,900 ducks annually, an increase of 100,100 ducks or 288 percent, these figures being based on calculations extrapolated from Gjersing (1971) and Mundinger (1975) (Appendix 4.6). Additional cover would be available to waterfowl (especially puddle ducks) on all or portions of the mechanically treated acres that are done within 0.5 miles of potholes and reservoirs.

The vegetation response from the rest by fencing all high value streamside riparian vegetation and saline seeps would increase the quality and/or quantity of food and cover used by waterfowl also but production cannot be quantified.

The number of new water sources proposed in this alternative would be the same as in Alternative A. Deferment until July 1 and grazing treatments with additional rest or deferment would have the potential of producing 23,100 additional ducks (or 66 percent), however. Canada geese production would be the same as in Alternative A. The figures are based on calculations extrapolated from Gjersing (1971), Mundinger (1975) and McCarthy (1973) and are also presented in Appendix 4.6.

NONGAME

Yearlong cover and food would be available to nongame wildlife from the July 1 deferment and from grazing treatments containing additional rest or deferment on the AMP allotments. Additional cover and forage would be available to nongame on the mechanically treated acres. Range management and livestock exclosure fences would provide additional perching sites for many nongame birds. Rest by fencing all high value streamside riparian vegetation and all saline seeps would provide additional food and cover to a wide variety of nongame.

Shore birds would increase with the improvement of present and additional shoreline as described in Alternative A.

This alternative proposes to maintain the 18 prairie dog towns at 1,715 acres which would provide habitat for the burrowing owl, mountain plover and other species associated with prairie dog towns while potential habitat for the black-footed ferret would also be maintained. Some control would be required to restrict the size of the present towns but the impact of this control would be insignificant.

FISHERIES

In the long term all 27 fisheries reservoirs would be rested from livestock grazing by fencing. The rest would have the same impacts as discussed in Alternative A. It is estimated that 3 fisheries would be lost to sedimentation (Jeffery Dose, 1980, BLM, Personal Communication, BLM Inventory File 6670). About 20 new fisheries reservoirs would be created in this alternative, however, increasing the number of viable fisheries reservoirs from 27 to 44 (63 percent) in the long term.

CONCLUSIONS

Forage and cover would improve or increase as discussed in this section in Alternative A.

An increase of 300 percent in the forage allocation to wildlife or 41,076 AUMs would be significant to wildlife. A 200 percent increase in deer and antelope on the 512 AMP allotments would also be significant,producing an additional 16,000 deer and 9,500 antelope.

A significant increase in residual vegetation from the deferment until July 1, additional rest or deferment on the AMP allotments totaling 1,621,740 acres and 225,000 acres of mechanical treatments would increase populations of upland game birds and nongame wildlife.

Annual duck production would increase significantly by 123,200 (354 percent) from the deferment until July 1 and additional rest or deferment on present and new water sources. Canada geese would increase 43 percent (2,350 geese) from the proposed 840 goose nesting islands, a significant increase also.

Fisheries reservoirs would increase significantly from 27 to 44 or 63 percent. A significant increase in high value streamside riparian vegetation in satisfactory condition from 58 to 186 miles or 221 percent would occur in this alternative. An increase of 1,933 acres of riparian vegetation in saline seeps below reservoirs would also be significant.

A moderately significant benefit to wildlife would be realized through the maintenance of the present 1,715 acres of prairie dog towns.

There would be no irretrievable or irreversible loss of wildlife resources in this alternative.

Recreation, Wilderness, Visual Resources

RECREATION

An increase of 200 percent in big game populations would cause an equal increase in hunting opportunities in the long term (Appendix 4.5). Waterfowl hunting opportunities would increase because of a potential 354 percent increase in ducks and 43 percent increase in Canada geese. Short term impacts to hunting would be negligible.

There would be a long term increase in fishing opportunities because of a net gain of 17 new fisheries, an increase of 63 percent in reservoir fisheries over the present situation ("Wildlife," Chapter 4). The fencing of all 27 fishing reservoirs and 186 miles of high value riparian zones would improve fishing quality.

Construction of fences would decrease cross country access but proposed cattle guards would eliminate some of this impact. Surface disturbance from mechanical treatments would restrict ORV travel.

There would be no short or long term changes in prairie dog shooting opportunities in this alternative.

WILDERNESS

Because of the constraints of the Wilderness IMP, new range projects or mechanical treatments must be non-impairing to wilderness before they would be allowed. No significant impacts to wilderness suitability would occur.

VISUAL RESOURCES

Mechanical treatments and range developments are proposed on approximately 13 percent of public lands, located primarily in Class III and Class IV landscapes. Individual projects would meet class guidelines and be distributed throughout the EIS area. Increased vegetation and removal of livestock from fenced riparian zones and fishing reservoirs would improve the aesthetics on specific sites. In the long term grazing systems would have the potential to improve scenic quality through increased vegetation and improved watershed, primarily in Class IV landscapes.

CONCLUSIONS

There would be a significant positive impact to both hunting and fishing opportunities in the long term. All current reservoirs would be fenced, improving fishing quality. Big game hunting opportunities would increase significantly and there would also be a large increase in waterfowl hunting opportunities. Fencing and mechanical treatments would create some moderately significant negative cross country access problems. Impacts to wilderness suitability of the Bittercreek WSA would be insignificant. No significant impacts to visual resources would occur in this alternative.

There would be no irretrievable or irreversible loss of recreation, visual or wilderness resources in this alternative.

Cultural Resources

This alternative would affect 229 sites, a relatively insignificant consequence because mitigating measures would preserve the physical evidence and information from these sites.

Any cultural site inadvertently destroyed in this alternative would be irretrievably and irreversibly lost.

CULTURAL IMPACTS SUMMARY — ALTERNATIVE D

Proposed Action	Acres Disturbed	Potential Sites Encountered	Probable Sites Avoided	Remaining Sites Impacted
Mechanical Treatments	225,000	2,250	2,025	225
Water Developments	4,000	40	36	4

Source: BLM, 1980

Social and Economic Impacts

RANCH ECONOMIC IMPACTS

There would be short term decreases and long term increases and decreases in net ranch incomes in this alternative with most of these decreases due to the total elimination of spring grazing. In the ranch budget analysis it is assumed the affected operator would reduce his herd size and shift some private grazing to spring use to make up for the BLM loss; however, not all operators would react in this way. Some might switch to yearling operations, lease grazing privileges or farm private land (intermingled with public) that they previously grazed.

Appendix 4.16 displays short term impacts to operations by representative size category. (There would be an additional temporary loss in grazing as mechanical treatments are applied or grazing systems implemented in addition to these changes. These losses could represent a significant impact to a few individual operators when their land is out of production.) Operations showing a decrease would total 404 while 154 have no change. The average operation would receive about 35 percent decrease in BLM AUMs and about a 9 percent decrease in total AUMs. The average decrease in net annual income for the representative livestock categories ranges from $890 on small operations (or 31 percent of the current livestock income) to $11,700 on very large operations (or 18 percent of the current livestock income). Of these operations, 169 would sustain more than a 10 percent loss in total ranch and farm income. Total decreases in net annual income to all affected ranch operators would be approximately $1,438,000, a decrease of 17 percent from the current livestock income for all ranches in the study. This figure is based on a decrease in gross annual livestock sales of $4,585,000.

Appendices 4.17 and 4.18 display long term impacts to operations by representative size category. Three hundred and eighteen operations show a decrease, eighty-six operations an increase and one hundred and fifty-four no change. The average operation showing negative impacts would receive about a 30 percent decrease in BLM AUMs and about a 7 percent decrease in total AUMs. The average decrease in net annual income by the representative livestock categories ranges from $690 on small operations (or 24 percent of their current livestock income) to $5,200 on very large operations (or 8 percent of their current livestock income). Of these operations, 87 would sustain more than a 10 percent loss in total ranch and farm income. The average operation showing positive long term impacts would receive about a 20 percent increase in BLM AUMs and a 6 percent increase in total AUMs. Over 80 percent of these operations fall into the small and medium livestock categories. Small livestock operations would see an average net annual increase of $225 (or 8 percent of their current livestock income) and medium livestock operations would see an average net annual increase of $350 (or 3 percent of their current livestock income). Total increases in annual income to all affected ranch operations would be $44,000, total decreases $717,000. This is a net decrease of $673,000, 8 percent of the current livestock income for all ranches in the study. This figure is based on a decrease in gross annual livestock sales of $2,235,000 from the present level.

Since a major source of income for most of the operators is the ranch, any reduction in ranch income would cause an equivalent reduction in their personal income. Even with substantial reductions in income, most small commercial operators would probably continue ranching, at least in the short term. Data gathered in the study area and from independent research indicate that ranch operators would try to maintain their ranching way of life at almost any cost (Smith and Martin, 1972). There are various actions that small operators might take to enable them to continue ranching. Those not now employed off the ranch might seek outside part-time or full-time employment, depending upon the availability of jobs, the operator and family work skills and the degree to which family members are now underemployed on the ranch.

In ranch business management,operators might not allow for depreciation or they might defer maintenance on improvements and machinery, replacing it only when absolutely necessary. Opportunity cost on equity capital might be ignored. Some operators might also borrow on their equity capital to meet short term operating and family living expenses but this process could not go on for very many years. Eventually the ranch operator would reach a point where he would have to account for depreciation costs. His debts might accumulate to the point where he would be faced with bankruptcy or selling out. These factors suggest that ranchers might be very resilient to reductions in BLM grazing; nevertheless, there would be significant financial hardship for some who might choose to persist.

In this alternative total permit values would decrease by $9,467,000 in the short term, $4,512,000 (or 14 percent of the present total) in the long term. These decreases in permit value would have a detrimental effect on ranchers' borrowing capacity and the sale value of affected ranches.

The decrease in ranch employment in this alternative would be the full time equivalent of approximately 44 employees in the short term and 21 employees (-12 percent of the present total) in the long term. However, losses of jobs could be somewhat less than expected as many operators would continue to employ the same number of workers because they could not reduce employees in small increments as AUMs were reduced.

RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

There would be little or no impact on direct and indirect recreation/wildlife related earnings and employment in the short term in this alternative. In the long term recreation/wildlife related direct expenditures for the intensive study area would increase by $276,000 annually, more than 200 percent over the present level. These expenditures would generate approximately $74,000 in direct and indirect earnings annually and are estimated to result in the employment of 7 people (Appendix 3.14).

SOCIAL IMPACTS

This alternative would have a predominately negative effect on the attitude toward BLM by ranchers and that part of the community that identifies with them. Sizeable decreases in vegetation allocated for livestock would be made and the resulting economic impacts would be substantial. Allocations of more forage to wildlife watershed would be viewed as a threat to the community's sense of security. The ranching community would feel the BLM was depriving them of the opportunity to lead a hardworking, independent life and was threatening their very existence just to benefit a few wild animals. This might lead to increased conflicts between ranch operators and hunters if ranchers reacted to this alternative by closing their private land to hunting. At the same time attitudes that recreationists and environmentalists (both in and out of the local community) hold would be favorably influenced because this alternative would conform to their beliefs and expectations of how public lands should be managed.

This alternative proposes a large number of AMPs (creation of 419 new and revision of 93 current AMPs) developed to benefit wildlife, watershed and would mean greater governmental presence and control. These AMPs would be viewed by the affected operator as a threat to his independence and traditional methods of operation. Thus ranchers would experience an increase in governmental control while at the same time experiencing a decrease in benefits to their operations.

The social well-being of approximately 539 ranch families (assuming 1.33 families per operation on the 404 affected operations) would be decreased in the short term. Thirty-two of these operations fall into the small livestock/small cash crop category where the potential for being affected is the greatest. In the long term the social well-being of about 424 ranch families (on 318 operations) would be decreased while the social well-being of 115 ranch families (on 86 operations) would be improved. Twenty-three of the operations with decreases and nine of the operations with increases fall into the small livestock/small cash crop category.

REGIONAL ECONOMIC IMPACTS

Appendix 4.19 shows the impact on the intensive study area output, earnings and employment of changes in livestock sales, range development construction, recreationist expenditures and government employment. In the short and long terms the largest impact would be from decreases in livestock sales. The direct and indirect intensive study area decreases in earnings generated from the change in livestock sales would range from $2,348,000 annually in the short term to $1,145,000 annually in the long term. In the long term intensive study area gross output would decrease by $4,770,000 annually because of the decrease in livestock sales.

Total intensive study area employment would decrease by 96 people in the short term and 78 persons in the long term. Total intensive study area earnings would decrease by $666,000 annually in the short term and $589,000 annually (0.3 percent of the present total) in the long term.

In the intensive study area valuation for livestock would decrease by an estimated $4,834,000 in the short term and $2,369,000 in the long term in this alternative. In the long term property taxes for livestock would decrease by $38,000, 7 percent of the current level for those ranches using public lands.

CONCLUSIONS

In the short term income would decrease on 404 operations in this alternative. The change in net ranch income would be a decrease of $1,438,000 annually (or 17 percent of the current livestock income for all ranches in the study). Permit values would decrease by 30 percent and ranch employment by 25 percent. Social well-being would be decreased for 539 families on the 404 operations; 32 of these are small livestock/small cash crop operations and 140 other operations would lose more than 10 percent of their total ranch/farm income. These short term decreases would be highly significant.

In the long term income would decrease by $717,000 annually on 318 operations and increase by $44,000 annually on 86 operations in this alternative. The net change in ranch income would be a decrease of $673,000 (or 8 percent of the current livestock income for all ranches in the study). Permit values would show a net decrease of 14 percent and ranch employment a decrease of 12 percent. Social well-being would be decreased for 424 families on 318 operations; 23 of these are small livestock/small cash crop operations and 66 other operations would lose more than 10 percent of their total ranch/farm income. These long term decreases are considered to be highly significant. Social well-being would be improved for 115 ranch families, including those on 9 small livestock/small cash crop operations. These long term increases would be moderately significant.

Changes in recreation/wildlife related earnings (+ $74,000) and employment (+ 7 positions) due to increased expenditures for recreation would be insignificant to the total economy of the intensive study area.

The overall impact on the attitudes of ranching oriented residents would be very negative because this alternative would decrease forage allocated for livestock and increase government presence and control. The impact on the attitudes of recreation/environmental oriented residents would be positive because substantial amounts of vegetation would be allocated for wildlife and watershed.

The short and long term direct and indirect decreases of 0.5 percent or less in intensive study area earnings and employment would be insignificant overall but any decrease in employment in an area which had high unemployment in the past might be viewed with alarm. The long term decrease in property tax would be an insignificant loss given the total property tax base.

There would be significant irretrievable losses of ranch income in this alternative. Some ranches might be unable to remain in business in their present form. There would also be irretrievable losses to the intensive study area earnings. There would be no irreversible losses.

ALTERNATIVE E

No domestic livestock would be permitted to graze on public lands in this alternative. The analysis of this alternative provides a basis of comparison for the environmental, social and economic consequences of the other alternatives.

Current grazing privileges would be revoked, including the present 93 AMPs. All agreements with cooperative grazing districts would be affected as well. No range improvements would be built or maintained unless the improvements were considered necessary for resource programs such as watershed or wildlife. Salvage rights would be granted or cash reimbursement made to ranchers who had contributed to range improvement facilities.

This program would eliminate the current permitted livestock use of 319,065 AUMs. In the "worst-case" situation, BLM would fence public lands to prevent livestock trespass. Five thousand miles of fences would be necessary for this undertaking, costing $15,126,500 according to 1980 cost estimates.

Watershed

Elimination of livestock grazing on public lands would bring about an immediate increase in vegetation production, providing more cover and litter to the soil surface. Vegetation cover and litter would increase the most on soil subgroups 3, 4, 6, 7, 10, 16 and 19 (see "Vegetation," Chapters 3 and 4). Water and sediment yields would decrease slowly in the long term in soil subgroups 1, 2, 5, 9, 11 and 18 dominated by clubmoss-blue grama vegetation that respond slowly to management. Sediment yield would decrease slightly from 5,351 acre-feet/year initially to 4,009 acre-feet/year in the long term. Water yield would increase from 210,874 acre-feet/year initially to 191,237 acre-feet/year in the long term. These increases also reflect the stagnation of vegetation and increases due to spread of noxious weeds on an additional 3,080 acres on soil subgroups 5, 6, 7, 9, 20, 27 and 18, and the spread of prairie dogs from 1,715 acres to 239,000 acres on soil subgroups 1, 2, 9, 10, 11 and 12.

Water quality would improve with the elimination of livestock grazing. Increased vegetation production on floodplain and riparian zones would result in lowered runoff and erosion. Reduced runoff would lower fecal bacteria, suspended sediment and nutrient loading of water sources. Increased riparian vegetation would improve stream channel stability and reduce erosion of stream banks and channels.

Water use by livestock would be reduced from 3,523 acre-feet/year initially to zero in the 7 year implementation period. In the long term this quantity of water would be available to downstream users. Current reservoirs would be maintained for uses other than for livestock.

CONCLUSIONS

The net effect of the elimination of livestock grazing on public lands would be a decrease in sediment yield from 5,351 acre-feet/year to 4,009 acre-feet/year in the long term (Table 4.7). Water yield would decrease from 210,874 acre-feet/year initially to 191,237 acre-feet/year (9 percent) in the long term, a significant decrease. Water quality would improve significantly with reduced levels of fecal bacteria, suspended sediment and nutrients contained in runoff water. The 3,523 acre-feet/year of water that would normally be consumed by livestock would be available to other users, including wildlife, recreation and downstream users.

There would be no irretrievable or irreversible loss to soil and water resources in this alternative.

TABLE 4.7 : SUMMARY OF WATERSHED IMPACTS BY TREATMENTS AND FACILITIES

ALTERNATIVE E

Element	Sediment Yield (ac-ft/yr) Initial	Sediment Yield (ac-ft/yr) Long Term	Water Yield (ac-ft/yr) Initial	Water Yield (ac-ft/yr) Long Term	Water Quality	Consumptive Water Use by Livestock (ac-ft/yr) Initial	Consumptive Water Use by Livestock (ac-ft/yr) Long Term
Grazing Treatments	0		0	0	0		
Exclosures	0		0	0	0		
Mechanical Land Treatments	0		0	0	0		
Range Facilities	0		0	0	0		
Water Developments	0		0	0	0		
Chemical Treatments							
-Noxious Weeds	9.4	16	82.5	193	+		
-Prairie Dogs	6.7	733	41.3	8,963	-		
Non-Treatment	5,335	3,260	10,329.4	182,076	+		
Totals for Existing and Proposed AMPs	5,351	4,009	210,874.9	191,237	+	3523	0

I - Insignificant
- - Not Applicable in this Alternative
Source: BLM, 1980

+1 - Increase Water Quality
0 - No Change in Water Quality
-1 - Decrease Water Quality

Vegetation

Eliminating livestock grazing would bring about a rapid improvement in plant vigor and vegetation cover. Ecological range condition would improve in the long term on the friable clay soils of subgroups 3, 4, 10 and 16 because these soils have a loose open surface which serves as a good seedbed. Experience has shown that vegetation response to rest is rapid on these soils. The floodplain and pothole soils of subgroups 6, 7 and 17 would also improve in ecological range condition due to an increase in desirable browse species and highly palatable grasses. The riparian vegetation in these subgroups would improve to the potential of the site (Appendix 3.9) (Winegar, 1977; Duff, 1977; Platts, 1978, 1979; Boldt, 1978; Behnke and Raleigh, 1978 and Ames, 1977). The sandy soils of soil subgroup 8 and the mountain soils of subgroups 15 and 19 would also improve in the long term from fair to good and from good to excellent condition because of the absence of restrictive factors such as clubmoss, claypans or stoniness.

The overall ecological range condition would improve from poor to fair ecological range condition on 535 acres, from poor to good on 749 acres, from fair to good on 60,476 acres, from fair to excellent on 104,809 acres and from good to excellent ecological range condition on 265,492 acres. A total of 432,061 acres would improve in ecological range condition. Increased production for consumptive and non-consumptive uses would total 60,488 AUMs. (See Appendix 2.2 for explanations of these range condition and AUM computations.)

Clubmoss-blue grama soils of subgroups 1, 2, 5, 9, 10, 11, 18 and dense clay and gravelly soils of subgroups 13 and 14 would improve very slowly, probably not enough to improve in ecological range condition significantly. A total of 1,075,097 acres would not change in condition in the long term.

Without the stimulation of grazing, plant vigor and production would level off and stagnate on most soils in the long term (Tuellar and Tower, 1979; Houston and Woodward, 1966).

About 5,000 miles of fences would be needed to exclude livestock from public lands. Construction and maintenance would disturb vegetation. If it were necessary to construct roads and trails in order to build and maintain fence on the boundary between public and other lands, a long term impact would result. Livestock trailing along the fences could impact private and state lands. If a two foot wide trail paralleled the fences, 1,212 acres would be disturbed, assuming ranchers continued to graze livestock on their lands.

Noxious weed and prairie dog control programs would probably not be carried out. Noxious weeds would probably spread to occupy an additional 3,080 acres in spite of the lack of grazing but would not affect overall vegetation production for non-consumptive uses. Prairie dog populations would probably remain near present levels without the influence of grazing on more responsive soils and they would increase on the clubmoss-blue grama soils. Prairie dogs require bare

IMPROVEMENT IN ECOLOGICAL RANGE CONDITION — ALTERNATIVE E

	Excellent Acres	Good Acres	Fair Acres	Poor Acres	Unclassified Acres
Present	14,832	1,035,208	623,022	6,803	69,373
Long Term	385,133	827,861	218,523	248,348	69,373

areas for protection from predators; improved vegetation production on responsive soils would reduce the amount of bare areas and control their numbers. On the clubmoss-blue grama sites on which most of the present towns are found, prairie dogs could conceivably increase to their biological potential of 239,000 acres, resulting in a decline of these acres from their present fair ecological range condition to poor. Site productivity losses resulting from the spread of prairie dogs would be 48,000 AUMs for consumptive and non-consumptive users, assuming a fair condition silty range site (5 acres/AUM) declining to poor condition (10 acres/AUM).

CONCLUSIONS

Alternative E would improve ecological range condition on 432,061 acres, decrease range condition on 242,080 acres and not significantly change range condition on 1,005,097 acres. Net production increase would total 12,488 AUMs for consumptive and non-consumptive uses. Plant vigor and vegetation cover would increase on all soils not infested with prairie dogs. Fences required to exclude grazing would affect vegetation slightly. Noxious weeds and prairie dogs would spread. The improvement in range condition would be of low significance, a net 10.9 percent of the acreage would improve.

The loss of vegetation production from the lower ecological range conditions brought about by the potential expansion of prairie dogs would be irretrievable but not irreversible.

Livestock

The elimination of livestock grazing on all public lands in the EIS area would cause a loss in livestock production of 22,334,550 pounds (Appendix 4.4).

The loss of grazing would reduce animal productivity on private and state lands, too, as livestock would have to trail to make use of the scattered private and state holdings. This would cause livestock stress and reduce calf weaning weights and other productivity factors. Stress would also be increased because of fences exclosing public lands. Livestock would be excluded from water, forage and shade areas on public lands and would trail along fence lines.

CONCLUSIONS

This alternative would reduce livestock production by 22,334,550 pounds. Livestock stress on non-public lands would increase and result in reduced productivity.

There would be a total irretrievable loss of permitted AUMs in this alternative but this would not be irreversible.

Wildlife

BIG GAME (DEER, ANTELOPE, ELK)

A 200 percent increase in deer and antelope populations is projected in the long term due to the absence of livestock grazing on public lands in the EIS area (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication; Appendix 4.5). An increase of 319,065 AUMs (from 20,538 to 339,603) would be available to satisfy the forage needs of the additional 16,000 deer and 9,500 antelope.

Grazing and land treatments would not be done in this alternative but the absence of livestock grazing would make adequate forage available to big game yearlong.

The removal of livestock could change the species composition on many soil subgroups. Some subgroups are held in a disclimax vegetation state through livestock grazing and produce abundant forb and shrub communities. In the long term with the absence of livestock grazing, vegetation on these soil subgroups would move toward a climax vegetation which is less desirable habitat for deer and antelope. The degree or amount of acreage is not known at this time but when BLM's SVIM data is available, projections could be made. An ungrazed plot in the Missouri River Breaks south of Glasgow, Montana has changed from a dominant shrub community to grasses in about 20 years (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication). Therefore, cattle are needed to maintain the vegetation used by big game on soil subgroups 3, 4 and 10. Otherwise, big game forage could decrease on some of the 430,930 acres in these soil subgroups.

The impacts of rest by fencing streamside riparian vegetation and 1 acre saline seeps below reservoirs are the same as the discussion in Alternative D.

The maintenance of water facilities would improve big game habitat but with the abundance of water available from other reservoirs, natural potholes and intermittent and permanent streams, this action would be of minor benefit.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE, RING-NECKED PHEASANT)

With no livestock grazing, residual vegetation on all 904 allotments would provide cover and food for additional upland game birds in the long term. This would allow all upland game birds the opportunity to move

towards their biological potential under the present ecological range condition. Additional food and cover would be available to these birds in high value streamside riparian vegetation as discussed in Alternative D. The quality and quantity of food and cover for upland game birds would increase with the maintenance of water on public lands and the absence of livestock grazing.

WATERFOWL

Removing livestock grazing would produce the same number of ducks on the present reservoirs as discussed in Alternative D. The absence of livestock grazing would also provide additional food and cover in the high value streamside riparian vegetation as discussed in Alternative D. Since no new water sources are proposed in this alternative, there would be no additional habitat from new water sources. Canada geese populations would remain as at present without additional water sources with goose nesting islands.

NONGAME

Sufficient food and cover would be available to nongame on all public lands with the absence of livestock grazing. The 5,000 miles of range management fences around all public lands would provide additional perching sites for nongame birds. The impacts on nongame wildlife on the high value streamside riparian vegetation would be the same as discussed in Alternative D.

Shore birds would increase with the improvement of present shorelines as described in Alternative A.

Prairie dog control is not proposed in this alternative so prairie dog towns could possibly expand to cover 239,000 acres. This projection is taken from data supplied by Tiegan (Howard Tiegan, 1980, U. S. Fish and Wildlife Service, Personal Communication). See figures 4.3 and 4.4. Prairie dog towns are located on soils which would not respond quickly to rest (soil subgroups 1, 2, 3, 4, 9, 10, 11 and 12). The 553,306 acres of poor or fair condition range lined with expansion routes (roads and trails) and livestock concentrations around reservoirs, insecticide devices/oilers and salt provide the areas for this potential expansion (Craig Knowles, 1980, University of Montana, Personal Communication). The potential increase in prairie dog towns would provide additional habitat for the burrowing owl, mountain plover and other species associated with prairie dogs. Potential habitat for the black-footed ferret would be increased. The potential expansion of the prairie dog towns would reduce the yearlong food and cover of many other wildlife species not associated with prairie dog towns, however.

FISHERIES

The effect on the present fisheries would be the same as discussed in Alternative D. No new fisheries reservoirs would be created in this alternative. Viable fisheries reservoirs would decrease from 27 to 24 (11 percent) in the long term through natural siltation.

FIGURE 4.3: RATE OF PRAIRIE DOG EXPANSION

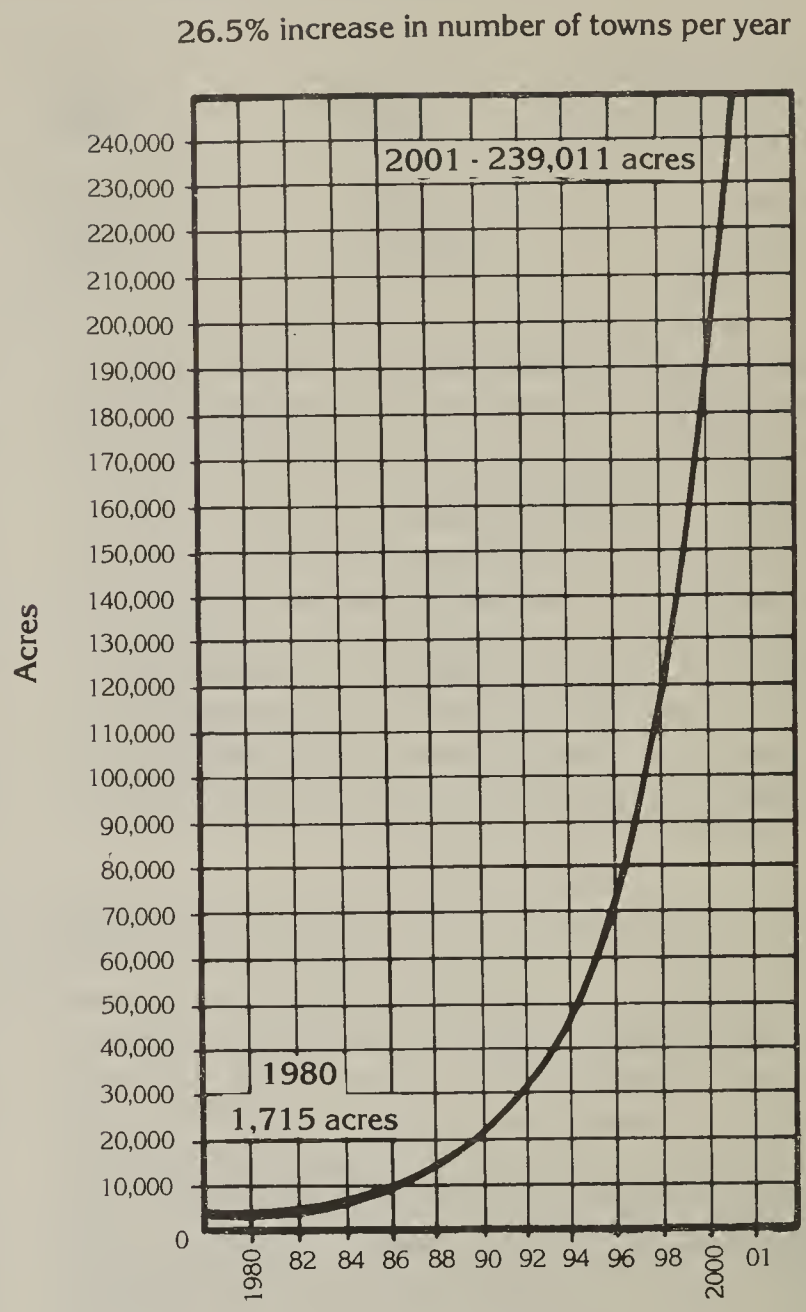
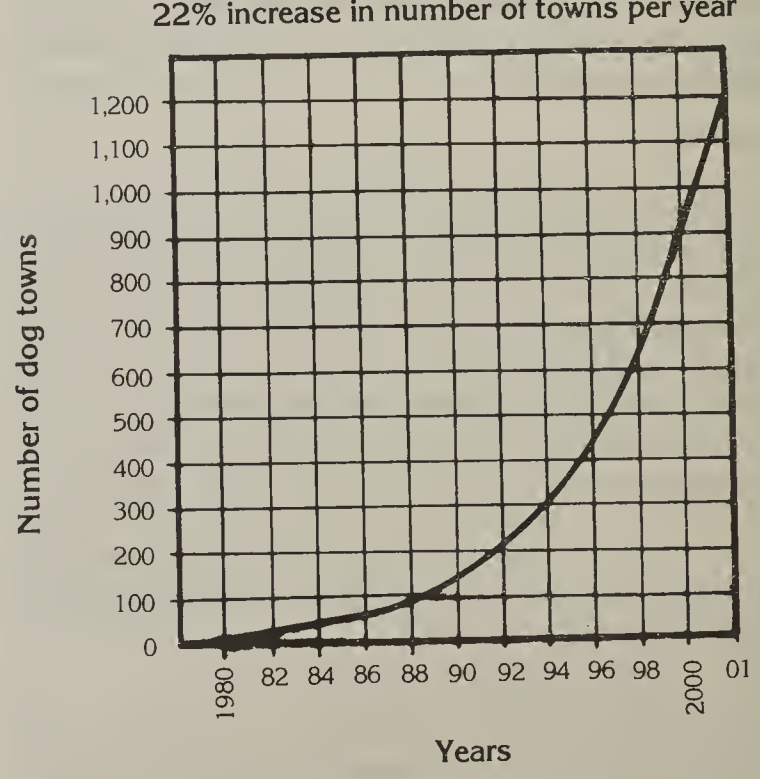


FIGURE 4.4: RATE OF PRAIRIE DOG EXPANSION



Extrapolated from data supplied by Howard Teigan 1980, Fish and Wildlife Service on the Buffalo Gap National Grasslands, South Dakota.

CONCLUSIONS

The lack of livestock grazing would not necessarily improve the quality or possibly the quantity of all wildlife forage and cover. Additional forage and cover would more than satisfy the needs of increased populations of upland game birds, waterfowl, nongame wildlife and fisheries. Big game forage, however, could be reduced as plant communities changed from shrubs to grass.

An increase in forage allocation of 319,065 AUMs to wildlife would occur in this alternative. Big game is projected to increase 200 percent on 904 allotments, producing an additional 16,000 deer and 9,500 antelope, a significant benefit to wildlife.

Residual vegetation would increase significantly from the total rest of public lands which would increase upland game birds and nongame wildlife populations.

A significant annual increase in duck production of 288 percent (100,100 ducks) from the absence of livestock grazing on present and new water sources would occur in this alternative. Since no additional goose nesting islands are proposed, the Canada geese population would remain 5,500.

High value streamside riparian vegetation in satisfactory condition would significantly increase from 58 to 186 miles or 221 percent.

The loss of 3 fisheries reservoirs (11 percent) would be insignificant. The expansion of prairie dogs could be moderately significant if this spread reduced the habitat of game and nongame wildlife not associated with prairie dog towns.

There would be no irretrievable or irreversible loss of wildlife resources in this alternative.

Recreation, Wilderness, Visual Resources

RECREATION

The removal of livestock from public lands would reduce the present conflicts between livestock and recreationists, including the presence of livestock, livestock wastes and the associated insects in fishing, camping and picnic areas as well as livestock concentrating in prime shooting areas during the hunting season.

Riparian zones with vegetation would rapidly improve without livestock. A 200 percent increase in big game populations would occur in both the short and long term, other factors remaining constant (Appendix 4.5). Big game hunting opportunities would increase significantly because of the improved habitat, larger populations and reduced conflicts with livestock. There would be some increase in waterfowl hunting opportunities because of the 288 percent increase in duck populations.

Fishing quality would improve in streams on public lands in the EIS area in this alternative. Removal of livestock would reduce sedimentation and water turbidity from cattle wading in streams, eliminate livestock-caused fecal coliform bacteria and improve aesthetics by eliminating livestock wastes along stream banks. On the other hand, several fisheries reservoirs that depend on periodic maintenance to support the grazing program might eventually silt in or wash out, effectively eliminating their recreational use. At least 3 of the present 27 fisheries reservoirs would be lost in the long term through natural siltation ("Wildlife," Chapter 4), an 11 percent decrease. Fishing quality would improve significantly on the remaining 24 reservoirs with the removal of livestock, however, other factors such as prairie dog populations around reservoirs remaining constant.

Roads and trails used to service range facilities would probably become unusable over time, causing negative impacts to recreationists who rely on these same roads for access to public lands. If private-public land boundaries were fenced, recreational access would even be further restricted by the 5,000 miles of fences necessary for this. The impacts associated with the fences would be relieved somewhat by the 385 cattle guards proposed in this alternative, however. Private landowners, denied the use of public lands for grazing, would probably reduce access to public lands through their property.

The most important impact to nongame hunting would come from the large increase in prairie dog populations. Prairie dog habitat has the biological potential to increase from the present 1,715 acres to 239,000 acres by the year 2003 ("Wildlife," Chapter 4). Prairie dog shooting opportunities would increase substantially.

WILDERNESS

There would be beneficial short term and long term impacts to wilderness in this alternative. Sights and sounds of livestock would no longer affect the solitude in the Bittercreek WSA. Range improvements would either be removed or allowed to deteriorate over time and livestock trailing or trampling and the associated erosion of heavy use areas would disappear. Cross fencing within the unit would no longer be necessary. Removal or deterioration of fences would free movement in the WSA.

VISUAL RESOURCES

There would be no significant impacts to visual resources in this alternative. Increased vegetation, as well as the removal or eventual deterioration of current range facilities, would create a positive effect on the scenic quality of public lands in the EIS area.

CONCLUSIONS

This alternative would have a significant positive impact on hunting opportunities because of increases in big game populations and fewer conflicts with livestock. Waterfowl hunting opportunities would improve with a 288 percent increase in duck populations. There would be marked improvement in the short and long term to 24 of the 27 fisheries reservoirs. There would also be moderate long term gains in the quality of stream fisheries.

There would be unquantified negative impacts to other recreational uses because of reduced access across private land. Removal of grazing and grazing associated activities would cause a moderately significant increase in wilderness suitability. Visual resources would be improved by the removal of livestock and the removal or decay of associated range facilities and the corresponding increase in vegetation.

There would be no irretrievable or irreversible loss of recreation, visual or wilderness resources in this alternative.

Cultural Resources

This alternative would affect no cultural sites. This would be significant since all sites would remain undisturbed and because the mitigation process would then be unnecessary.

There would be no irretrievable or irreversible loss of cultural sites in this alternative.

Social and Economic Impacts

RANCH ECONOMIC IMPACTS

In this alternative all grazing on public lands would be eliminated in the short and long term on the 558 affected operations. Appendix 4.20 displays the impacts to operators by representative size categories. The average operation is 28 percent dependent on BLM grazing for its total requirement. The small livestock category shows an estimated 183 percent decrease in ranch income while the medium, large and very large categories show an estimated 140 percent decrease. Without Federal grazing, each of the representative livestock categories would move from a positive income position to operate at a loss; income would no longer cover cash costs and depreciation. For 213 operators (38 percent), this loss of BLM AUMs means a loss of more than 30 percent of their total ranch grazing. The loss for these operators would be greater than the 140-184 percent decreases as shown on the representative ranches. Even when cash crop income is added in, the representative ranch/farms all would still lose substantial portions of their income. See Alternative D for the types of actions that a rancher might take to continue operations at a net cash loss, at least in the short term. Total decreases in net annual income to all affected ranch operations would be approximately $12,311,000, a decrease of 144 percent from the current livestock total.

Elimination of Federal grazing would reduce permit values for the 558 affected ranches by the full amount of their current value of $31,258,000. These decreases in permit value would have a detrimental effect on ranchers borrowing capacity and the sale value of affected ranches. For ranches that are heavily dependent on BLM AUMs, the overall reduction in ranch value could be considerably more than the $100 per AUM because elimination of Federal grazing may virtually destroy the ranch as an economic unit.

Reduction in hired ranch employment that would be caused by total elimination of Federal grazing permits is estimated to be the full time equivalent of 117 workers. This would be a 67 percent reduction from the current level of employment on the 558 operations. However, loss of jobs could be somewhat less than expected. Many operators would continue to employ the same number of workers because they could not reduce employees in small increments as AUMs were reduced.

RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

In this alternative deer and antelope populations would show short term increases resulting in an increase of $260,000 in direct expenditures in the intensive study area (nearly 200 percent). These expenditures would generate approximately $70,000 in direct and indirect earnings annually and are estimated to result in the employment of 7 people. In the long term when increased expenditures for waterfowl hunting are also added in, direct and indirect earnings increase by $73,000 annually from the current levels (Appendix 3.14).

SOCIAL IMPACTS

Elimination of all livestock grazing would have a devastating effect on all ranching oriented residents, resulting in extremely negative attitudes toward BLM. The local residents see the increasing involvement of the Federal government in their lives as one of the biggest threats to their present lifestyle. This alternative would strengthen their resolve that administration and planning for public lands should be at the local level. Although vegetation for wildlife and watershed would increase, recreationists and environmentalists might not approve of the 5,000 miles of fences that would have to be constructed to exclude livestock. In addition this alternative might lead to increased conflicts between hunters and ranchers as ranchers might react by closing their private land to hunting.

The social well-being of about 744 ranch families (assuming 1.33 families per operation on the 558 affected operations) would be decreased in the short

and long terms. Using representative ranch categories, all livestock operations would now be operating at a loss. Forty-six of these operations fall into the small livestock/small cash crop category where the potential for being affected is the greatest.

REGIONAL ECONOMIC IMPACTS

Appendix 4.21 shows the impact on the intensive study area output, earnings and employment of changes in livestock sales, range development, construction, recreationist expenditures and government employment. In the short and long term the greatest impact would be from decreases generated by a loss in livestock sales. These changes would result in a loss of $7,274,000 annually in earnings and 710 in employment in the intensive study area.

Total employment in the intensive study area would decrease by 570 people in the short term and 669 people in the long term. Total earnings would decrease by $5,516,000 annually in the short term and $6,543,000 annually (over 3 percent of the current intensive study area total) in the long term.

For both the short and long terms, assessed valuation for livestock would be decreased by an estimated $14,948,000 and property taxes by $239,000 in the intensive study area. This is a 43 percent decrease from the tax currently paid for livestock by these operators.

CONCLUSIONS

In the short and long term income would decrease on all 558 operations in this alternative. The decrease in net ranch income would be–144 percent of the current total. Permit values would decrease by 100 percent and ranch employment by 67 percent. The social well-being of 744 families would be reduced because of the changes in income and permit value. Forty-six of these are small livestock/small cash crop operations and 195 others would lose more than 140-180 percent of their current income. These impacts are considered to be highly significant.

Long term changes in recreation/wildlife related earnings (+ $73,000) and employment (+ 7 positions) due to increased expenditures for recreation would be insignificant to the total economy of the intensive study area.

The overall impact on the attitudes of ranching oriented residents would be extremely negative. Recreationists and environmentalists would be expected to hold more moderate views.

The short and long term direct and indirect decreases of 2.8 to 3.4 percent in intensive study area earnings and employment would be considered moderately significant. The decreases in employment would be very severe locally. The decrease in property taxes (43 percent) would also be moderately significant.

There would be very significant irretrievable losses of ranch income in this alternative. A significant number of ranches might be unable to remain in business in their present form. There would also be significant irretrievable losses to intensive study area earnings. There would be no irreversible losses.

ALTERNATIVE F

The current range program would be "frozen" under this alternative. The 93 established AMPs would continue on 558,986 acres but no new AMPs would be implemented on the remaining 1,184,008 acres (904 allotments). No new range developments (reservoirs, fences, pipelines, etc.) would be constructed even in support of present AMPs. No changes in current levels of permitted livestock use would be allowed.

Initial and long term vegetation allocations would be the same for the long term as the initial allocations: 319,065 AUMs for livestock, 20,538 AUMs for wildlife and 339,603 to non-consumptive use. No additional costs above present maintenance expenditures would be incurred because no new improvements would be constructed.

All future options in range management would be forgone under this alternative. There would be no opportunity to correct erosion problems, increase or decrease livestock numbers, change kinds of livestock, adjust seasons-of-use, or improve range management. Little improvement would be expected on the 20 AMP allotments (156,195 acres) which are currently in less than 50 percent good condition.

The analysis shows future conditions in the area likely to occur as a result of continuing the present rangeland trends.

Watershed

Maintaining the current 93 AMPs without the option to make changes or adjustments in grazing treatments, stocking rates and seasons of use would result in a deterioration of watershed condition and water quality in the long term ("Vegetation", Chapters 3 and 4). Without the chance to change stocking rates, abuse or overgrazing of vegetation would decrease vegetation cover and cause accelerated erosion. Continuation of early seasons use without periodic rest or deferment would reduce vegetation cover through compaction of soils in the long term and increase runoff and erosion, particularily on soil subgroups 2, 5, 6, 9, 10, 12 and 18. The loss of the ability to make management changes in livestock grazing on the 93 current AMPs would result in substantial increases in sediment and water yields. Sediment yield would not change from 1,030 acre-feet/year in the long term, while water yield would not

increase from 45,208 acre-feet/year in the long term. Downstream users would benefit from water yield increases but increases in sediment and water yield would decrease water quality from increased amounts of suspended sediment, nutrients and fecal bacteria in surface waters and increasing sediment loading of reservoirs and stream channels. Part of the increase in sediment and water yields would come from increases in the spread of noxious weeds and prairie dogs. Grazing pressure would intensify on non-infested areas. In the long term noxious weeds and prairie dogs would spread to cover a total of 244,280 acres, providing little, if any, desirable watershed cover.

Lack of new water sources would result in continued concentration and heavy use of vegetation by livestock near reservoirs and other water sources. Areas more distant from water (greater than 1½ miles) would receive light use. Consumptive water use by livestock would remain at the current level of 3,523 acre-feet/year.

CONCLUSIONS

Without the ability to make modifications to grazing treatments on the current 93 AUMs, there would be moderately significant increases in sediment and water yields (Table 4.8). Sediment and water yields would increase with the spread of noxious weeds and prairie dogs to 244,280 acres with decreases in the quantity and quality of watershed cover. Sediment yield would increase from 4,679 acre-feet/year to 5,432 acre-feet/year in the long term. Water yield would increase by 29,080 acre-feet/year to 218,008 acre-feet/year in the long term. Water quality would be reduced significantly in the long term due to increased sediment and water yields.

Consumptive use of water by livestock would remain at the current quantity of 3,523 acre-feet/year in the long term.

The loss of soil in this alternative due to erosion would be irretrievable but not irreversible. There would be no irretrievable or irreversible loss of water resources.

TABLE 4.8 : SUMMARY OF WATERSHED IMPACTS BY TREATMENTS AND FACILITIES

ALTERNATIVE F

Element	Sediment Yield (ac-ft/yr) Initial	Sediment Yield (ac-ft/yr) Long Term	Water Yield (ac-ft/yr) Initial	Water Yield (ac-ft/yr) Long Term	Water Quality	Consumptive Water Use by Livestock (ac-ft/yr) Initial	Consumptive Water Use by Livestock (ac-ft/yr) Long Term
Grazing Treatments	1,030	1,030	45,208	45,208	0		
Exclosures							
Mechanical Land Treatments							
Range Facilities							
Water Developments							
Chemical Treatments							
—Noxious Weeds	9.4	16	266	639			
—Prairie Dogs	6.7	733	208	28,915			
Non-Treatment	3,633.4	3,653	143,246	143,246			
Totals for Existing and Proposed AMPs	4,679	5,432	188,928	218,008		3,523	3,523

I - Insignificant
- - Not Applicable in this Alternative

1 - Increase Water Quality
0 - No Change in Water Quality
-1 - Decrease Water Quality

Source: BLM, 1980

—Noxious Weeds
—Prairie Dogs

Vegetation

The current allocations and seasons of use would continue on allotments where early spring use is contributing to unsatisfactory resource conditions. Adverse impacts of early spring use would not be reduced by rest and deferment grazing treatments. This would result in a continuance of present unsatisfactory conditions on 138 allotments (335,048 acres) and probably result in a downward trend in the long term, especially in floodplains, riparian zones and other livestock concentration areas.

The current grazing systems would be maintained in the 93 AMP allotments; no revisions could be made to correct problems. Current trends (Tables 3.9-3.12) would be expected to continue in the short term but might decline in the long term since there is no opportunity to make changes in response to problems. Concentration areas along riparian zones and around reservoirs would continue to be heavily grazed season long on many potential AMP allotments.

Clubmoss-blue grama and crested wheatgrass sites suitable for mechanical treatments and soils responsive to grazing treatments would continue to produce far below their potential. Leafy spurge and other noxious weeds would spread and infest a further 3,080 acres; this would reduce forage production in these areas by 75 percent (462 AUMs at 5 acres/AUM) and reduce range condition to fair or poor on the infested acres.

No prairie dog control measures would be taken on public lands. Potentially, 239,000 acres of good and fair condition range could decline to poor condition and livestock forage production would decrease by about 35,850 AUMs in the long term due to the increase in prairie dogs, assuming a 75 percent production in forage availability and production on a silty range site in fair condition.

Maintenance of current allocations and seasons of use without control of prairie dogs and noxious weeds would result in reduced forage supplies, overuse and deteriorated range condition from fair to poor ecological range condition on 244,280 acres (based on projections of leafy spurge and prairie dog spread). This is 13.9 percent of public lands in the EIS area. The loss of forage on these acres with a continuation of current allocations would result in an estimated 125,000 additional acres presently in good ecological range condition deteriorating to fair condition and a loss of 7,500 livestock AUMs based on professional judgment.

CONCLUSIONS

This alternative would result in a general maintenance of present trends and ecological range conditions in the short term and a significant decline in the long term. A total of 43,812 livestock AUMs would be lost because of a decline in range condition on 369,280 acres, a 13.7 percent reduction in available livestock forage. Since allocations to livestock would remain unchanged, a continuing decline in condition and productivity would result. Long term ecological range condition would be as shown below.

The loss of vegetation production by lower ecological condition range from the potential expansion of prairie dogs would be irretrievable but not irreversible.

Livestock

Current allocations would not change in the short or long term in this alternative but forage supplies would be expected to decrease in the long term. Livestock production would remain fairly static in the short term. Long term reductions in forage supplies (see "Vegetation") would result in heavier grazing on some allotments if current use continued. The loss of forage would probably be drastic on some allotments while minor on others. For example, livestock production would be reduced markedly on allotments severely affected by leafy spurge and/or prairie dogs. Were livestock numbers not reduced on these allotments as forage was depleted, calf weaning weights, the weights of cows going into the winter and calf crops would decrease while the mortality of cows and calves would increase (Houston and Woodward, 1966). The predicted long term loss in forage translates to a reduction in livestock production of 3,066,840 pounds (Appendix 4.4).

There would be no change in seasons of use, grazing or land treatments in response to depleted forage supplies. Poor livestock distribution would continue because of insufficient water supplies, shade sources, and insecticide devices/oilers and would contribute to lower animal production, especially under heavy grazing.

IMPROVEMENT IN ECOLOGICAL RANGE CONDITION — ALTERNATIVE F

	Excellent Acres	Good Acres	Fair Acres	Poor Acres	Unclassified Acres
Present	14,832	1,035,208	623,022	6,803	69,373
Long Term	14,832	907,128	509,022	248,883	69,373

CONCLUSIONS

Red meat production would remain static during the short term but would decline by 3,066,840 pounds (live weight) in the long term because of the spread of noxious weeds and prairie dogs and because of the lack of improved grazing management.

There would be no irretrievable or irreversible loss of livestock resources in this alternative.

Wildlife

BIG GAME (DEER, ANTELOPE, ELK)

No increase in deer and antelope populations is projected in the long term due to current grazing treatments on the AMP allotments (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication; Appendix 4.5).

Conflicts which currently exist between livestock and big game would remain and could possibly increase in the long term because of season long grazing. Big game populations are increasing (Richard Trueblood, 1980, Montana Department of Fish, Wildlife and Parks, Personal Communication) and the amount of available forage would determine the significance of any conflicts, especially during the late winter and spring.

Mechanical treatments are not proposed in this alternative,so no additional forage would be available to big game. The lack of rest would reduce forage for big game on high value streamside riparian vegetation (Jeffery Dose, 1980, BLM, Personal Communication). This vegetation would decrease from 58 to 52 miles (1,406 to 1,261 acres). Thus 52 miles (28 percent) of the high value riparian vegetation would be in satisfactory condition, a decrease of 10 percent. However, 134 miles (3,248 acres or 72 percent) of the high value streamside riparian vegetation would remain in unsatisfactory condition.

UPLAND GAME BIRDS (SHARP-TAILED GROUSE, SAGE GROUSE, RING-NECKED PHEASANT)

In the long term no additional vegetation would be available for upland game birds from season long grazing treatments. The 93 current AMP allotments totaling 558,986 acres, however, would help provide cover and food for any increase in upland game birds.

WATERFOWL

No additional residual vegetation would be available to increase waterfowl production due to season long grazing on 811 allotments. Approximately 34,800 ducks and 5,500 Canada geese would be produced annually on the current reservoirs and natural potholes, however. These figures are based on calculations taken from Gjersing (1971), Mundinger (1975) and Hoff (Christopher Hoff, 1980, BLM, Personal Communication) and are presented in Appendix 4.6.

NONGAME

No additional residual vegetation would be available to nongame. Some of the 93 current AMP allotments would provide additional residual cover but the process would be slow due to the static or slight upward trend in vegetation production on these allotments.

No additional cover or food would be available to shore birds on the 1,650 miles of present shorelines because of season long grazing. The impacts of prairie dog towns increasing to 239,000 acres would be the same as discussed in Alternative E.

FISHERIES

In the long term vegetation removal around fisheries reservories would continue. It is estimated that 15 of the 27 reservoirs would be lost as viable fisheries because of accelerated sedimentation (Jeffery Dose, 1980, BLM, Personal Communication; BLM Inventory File 6670). No new reservoirs would be built in this alternative, decreasing the overall number of viable fisheries reservoirs from 17 to 12 (56 percent) in the long term.

CONCLUSIONS

The lack of grazing treatments with rest or deferment would not improve the quality or increase the quantity of wildlife food and cover on 811 non-AMP allotments totaling 1,184,008 acres. The food and cover would only satisfy the present populations in the short term. In the long term forage and cover would remain static or be reduced in quality with the lack of grazing treatments with rest or deferment and lack of range facilities and developments.

Prairie dogs and associated wildlife species would significantly benefit from the expansion of prairie dog towns to 239,000 acres. This spread would moderately reduce the habitat of game and nongame species not associated with prairie dog towns, a moderately significant impact.

No increase in the forage allocation to wildlife would occur in this alternative, a moderately significant impact.

Sufficient residual vegetation would be available to support the present populations of upland game birds and nongame wildlife species only in the 811 non-AMP allotments. Some additional cover and forage would be available on the 93 present AMP allotments. This would be a moderately significant impact to wildlife.

Duck and Canada geese populations would remain as at present, 34,800 and 5,500 respectively. There would be no additional ducks or geese, both moderately significant impacts to wildlife.

There would be significant decreases in fisheries reservoirs from 27 to 12 or 56 percent and in high value streamside riparian vegetation in satisfactory condition from 58 to 52 miles or 10 percent.

There would be no irretrievable or irreversible loss of wildlife resources in this alternative.

Recreation, Wilderness, Visual Resources

RECREATION

This alternative would cause no major change in recreational opportunities from the current situation in the short term. There should be no change in big game populations (Appendix 4.5) in either the short or long term and no significant change in big game hunting opportunities.

BLM fisheries biologists have estimated a long term loss of 15 fishing reservoirs ("Wildlife," Chapter 4). This would be a net loss of 56 percent of the fishing opportunities from reservoirs in the EIS area.

Impacts to prairie dog hunting would be the same as those in Alternative E.

On allotments with AMPs, 6 percent are presently in a downward trend in range condition. Those AMPs with riparian zones presently in a downward trend would continue to deteriorate slightly, thus reducing wildlife habitat and aesthetic values.

WILDERNESS

There would not be any significant impact to wilderness. Maintenance of current range improvements would be allowed in the Bittercreek WSA. Current levels of grazing would be guaranteed through FLPMA and the IMP.

VISUAL RESOURCES

There would be no significant impact to visual resources in this alternative as no new range developments would be allowed.

CONCLUSIONS

Fishing opportunities would decrease significantly. Big game populations should stabilize but because of increases in prairie dogs and a more than doubling of the acreage of noxious weeds, ("Vegetation"), competition with livestock for forage would increase while the physical condition of wildlife would decrease. Wildlife would be left vulnerable to natural processes such as weather. Prairie dog shooting opportunities would increase significantly in the long term. There would be no significant impacts to wilderness or visual resources.

There would be no irretrievable or irreversible loss of recreation, visual or wilderness resources in this alternative.



Cultural Resources

This alternative would affect no sites but some site damage could be expected from the increased erosion resulting from deteriorating range conditions on some allotments. This would be a relatively insignificant consequence since mitigating measures would preserve the physical evidence and information from those sites affected by maintenance projects on the current developments.

There would be no irretrievable or irreversible loss of cultural resources in this alternative.



Cairn

Social and Economic Impacts

RANCH ECONOMIC IMPACTS

In this alternative the same number of BLM AUMs would be authorized in the future as in the present, so, at least "on paper," there would be no impacts. Without AMPs, range condition on public lands would deteriorate in the long term in many areas and therefore the real amount and quality of forage available to livestock would decrease. Calf weaning weights, weights of cows going into the winter and calf crops would decrease while the mortality of cows and calves would increase. This would have a real dollar impact on ranch income. The nature and extent of the impact cannot be projected because the BLM would not place additional controls on livestock grazing in this alternative.

There would probably not be any real impact on permit values because ranch operators would continue to show on paper the same number of AUMs authorized in the future as now. In some cases, however, the authorized amount of forage would not be available. There probably would be some real impact on hired ranch employment but this cannot be estimated because the BLM would not force any ranch operators to reduce the size of their livestock herds through grazing reductions.



RECREATION/WILDLIFE RELATED ECONOMIC IMPACTS

In this alternative there would be no sustained short or long term changes in deer, antelope and waterfowl populations. Therefore, there would be no change in earnings or employment in the intensive study area due to changes in hunting opportunities. Long term decreases in range condition, however, would make wildlife populations more susceptible to other environmental factors, such as weather.

SOCIAL IMPACTS

The initial effect of this alternative on the attitude of ranching oriented residents toward BLM would be positive because it essentially preserves the status quo, a value held very high by most residents of the region. In the long term, however, their attitude would become increasingly negative as range conditions deterioriated. Alternative F would also be unfavorably received by environmentalists and recreationists who want to see the BLM intensify efforts to restore range, wildlife and watershed conditions. This alternative proposes no new AMPs and would result in less governmental presence and control.

At least on paper, there would appear to be no change in the social well-being of the estimated 744 ranch families on the 558 affected operations. In many places, however, the long term deterioration of the range would decrease the amount and quality of forage available to livestock and eventually result in a decrease in ranch income.

REGIONAL ECONOMIC IMPACTS

There would be no grazing adjustments in this alternative and therefore no quantified changes in expenditures, earnings and employment in the intensive study area. In the long term deteriorating range conditions would have a real dollar impact on ranch income and therefore on the regional economy. Additionally, changes in livestock numbers might result in a change in the personal property tax base because fewer livestock could be supported by public lands.

CONCLUSIONS

No changes in ranch income and employment can be quantified in this alternative. However, reductions in both are likely in the long term as forage production decreases. Therefore, on paper, there would be no change in the social well-being of the 744 families on the 558 affected operations although long term reductions in income are a definite possibility.

There would be no quantifiable change in expenditures for recreation, so there would be no change in recreation/wildlife related earnings and employment.

The overall impact on the attitudes of ranching-oriented residents would be positive initially and grow increasingly negative as range conditions deteriorated in the long term. The impacts on the attitudes of recreationists and environmentalists who want to see public lands restored would be negative.

There would be no quantifiable changes in expenditures so there would be no change in direct and indirect earnings and employment in the intensive study area. There would also be no quantifiable changes in livestock numbers and resulting changes in the property tax base. The predicted long term deterioration of the range might, however, negatively effect intensive study area earnings, employment and livestock numbers.

There would be no recognized irretrievable or irreversible loss in this alternative.



Little Bluestem

CHAPTER 5
CONSULTATION and COORDINATION

CONSULTATION and COORDINATION

The Prairie Potholes Draft Environmental Impact Statement was prepared by specialists from the BLM's Lewistown District Office with assistance from BLM's Havre, Phillips, and Valley Resource Areas and the Montana State Office. Disciplines and skills used to develop this EIS were: vegetation and rangeland use, animal husbandry, recreation, climate, sociology, economics, geology, hydrology, soils, cultural resources, wildlife, fisheries, graphics, editing, printing, public affairs and typing. Writing of the EIS began in September 1980 following a complex planning and data gathering process stretching back to 1977. The process included inventories of resources, public participation, coordination with other agencies and a modified planning effort. Consultation and coordination with agencies, organizations and individuals occurred in a variety of ways throughout this process.

PUBLIC INVOLVEMENT and CONSULTATION DURING DEVELOPMENT of the DRAFT EIS

An intense public participation process was conducted during the development of this EIS. An analysis document, a sampling of public opinion by interviews of people in the Hi-Line communities, a program to draw issues from the public and a notice in the "Federal Register" were all used to elicit public views on the EIS. This process also drew useful comments from other agencies.

The major portion of the public participation process was identifying issues which the public wanted considered in this EIS. This procedure consisted of the mass mailing of an information brochure, letter and return mailer asking for issues people felt should be considered in the Prairie Potholes EIS. A summary of these responses was provided in another brochure mailed back to the original recipients.

Included with the second brochure was a schedule for public open houses held in the Havre, Phillips and Valley BLM Resource Area Offices. The open houses were used to explain the EIS process, gather additional views and inform people of how the issues would be used. From this procedure, an additional alternative was added to the EIS—the Continuation of Present Management. After an analysis of this alternative it was selected as BLM's "preferred alternative."

As can be seen, the public's role was vital in the development of this EIS.

The Montana State Historical Preservation Officer (SHPO) was consulted and commented on this EIS. SHPO along with the Advisory Council on Historic Preservation, will have an opportunity to review the draft EIS.

Informal consultation with the U.S. Fish and Wildlife Service regarding threatened and endangered species also took place during the preparation of this EIS. Region 6 personnel of the Montana Department of Fish, Wildlife and Parks informally reviewed draft sections on wildlife and indicated that their comments were properly depicted in the EIS.

OTHER AGENCIES and ORGANIZATIONS CONSULTED

The Prairie Potholes EIS team consulted and/or received comments from the following during the preparation of the draft EIS:

Federal Agencies:

Forest Service
Soil Conservation Service
Bureau of Indian Affairs
Bureau of Mines
Corps of Engineers
Department of Commerce
Fish and Wildlife Service
Geological Survey
National Park Service
National Weather Bureau

State Agencies and Organizations:

Montana Agricultural Experiment Station
Montana Cooperative Extension Service
Montana Department of Fish, Wildlife, and Parks
Montana Bureau of Mines and Geology
Montana Historical Society
Northern Montana College

County Commissioners and Planning Boards:

Blaine County
Choteau County
Hill County
Liberty County
Toole County
Glacier County
Phillips County
Roosevelt County
Daniels County
Sheridan County
Valley County

Special Interest Groups:

Montana Public Lands Council
Montana Stockgrowers Association
Montana Woolgrowers Association
Badlands Cooperative State Grazing District (CSGD)
Buggy Creek CSGD
Cherry Creek CSGD
Coal Creek CSGD
Lohman CSGD
North Fork CSGD
North Phillips CSGD
North Valley CSGD
South Phillips CSGD
Wayne Creek CSGD
Willow Creek CSGD

Further comments are expected from public hearings scheduled for the spring of 1981. Copies of the draft EIS will be available for public review at BLM Offices in Billings, Lewistown, Havre, Malta and Glasgow, and at public libraries in communities in the Prairie Potholes area.

COMMENTS REQUESTED

Comments on the draft EIS have been requested from the following agencies, organizations, and interest groups:

Federal Agencies:

Advisory Council on Historic Preservation
Department of Agriculture
  Forest Service
  Soil Conservation Service
Department of Defense
  U. S. Army Corps of Engineers
Department of Commerce
Department of the Interior
  Bureau of Indian Affairs
  Bureau of Mines
  Fish and Wildlife Service
  Geological Survey
  Heritage Conservation and Recreation Service
  National Park Service
  Water and Power Resource Service
Environmental Protection Agency
Science and Education Administration

Congressional Offices:

Office of Congressman Marlenee
Office of Congressman Williams
Office of Senator Baucus
Office of Senator Melcher

State Agencies:

Montana Association of State Grazing Districts
Montana Department of Community Affairs
Montana Cooperative Extension Service
Montana Department of Fish, Wildlife, and Parks
Montana Department of Health and Environmental Services, Water Quality Bureau
Montana Department of Natural Resources and Conservation
Montana Department of State Lands
Montana Governor's Office
Montana Historical Society
Montana State University
Old West Regional Commission
University of Montana

County Commissioners and Planning Boards:

Blaine County
Chouteau County
Hill County
Liberty County
Toole County
Glacier County
Phillips County
Roosevelt County
Daniels County
Sheridan County
Valley County

Other Organizations:

Ada County Fish and Game League
Association of State Grazing Districts
American Horse Protective Association
Audubon Society
Chinook Rod and Gun Club
Blaine County Farm Bureau
Defenders of Wildlife
Friends of the Earth
Fergus County Farm Bureau
International Society for Protection of Mustang and Burros
Izaak Walton League of America
Lewistown Rod and Gun Club
Lewistown Bowhunters Association
Montana Chamber of Commerce
Montana Farm Bureau
Montana Farmers Union
Montana Historical Society
Montana Public Lands Council
Montana Stockgrowers Association
Montana Wilderness Association
Montana Wildlife Association
Montana Woolgrowers Association
National Council of Public Land Users
Natural Resources Defense Council
Nevada Outdoor Recreation Association, Inc
Northern Plains Resource Council

Phillips County Cowbells
Public Lands Council
Trout Unlimited
Sierra Club

University of Montana
Valley County Development Center
Society for Range Management
Valley County Farm Bureau
Wild Horse Organized Assistance
Wilderness Society
Wildlife Management Institute
Wildlife Society, Montana Chapter

Individuals

James Morgan (plaintiff in Natural Resources Defense Council, Inc., et al. vs. Rogers C. B. Morton, et al.)

LIST of PREPARERS

The following are the people who put this EIS together:

Georges L. "Buck" Damone: Project Manager
BS Forestry, University of Maine. Buck has worked for 11 years with the BLM before joining the Prairie Potholes EIS team. He was responsible for the overall coordination of the project.

Lloyd A. Fusselman: Team Leader
BS Range Conservation, Utah State University. Lloyd was with the USFS in Arizona and New Mexico before coming to BLM. He worked for BLM six years before becoming Team Leader and Technical Coordinator for the Prairie Potholes EIS Team.

Clair Clark: Soil Scientist
BS Soils, Montana State University where he graduated with honors, graduate work in Soils, Iowa State University. Clair worked for 31 years with the SCS before joining BLM in June 1979. He prepared the "Soils" section and helped with the "Vegetation" section of this EIS.

Keith Sandifer: Hydrologist
BS Geology, MS Geography, University of Southern Mississippi, .graduate work in Hydrology, Oregon State University. Keith has worked for two years with BLM. He prepared the "Climate and Air Quality," "Geology," and the "Water Resources" sections and helped with the "Soils" section. He also acted as an assistant technical coordinator.

John Fahlgren: Range Conservationist
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